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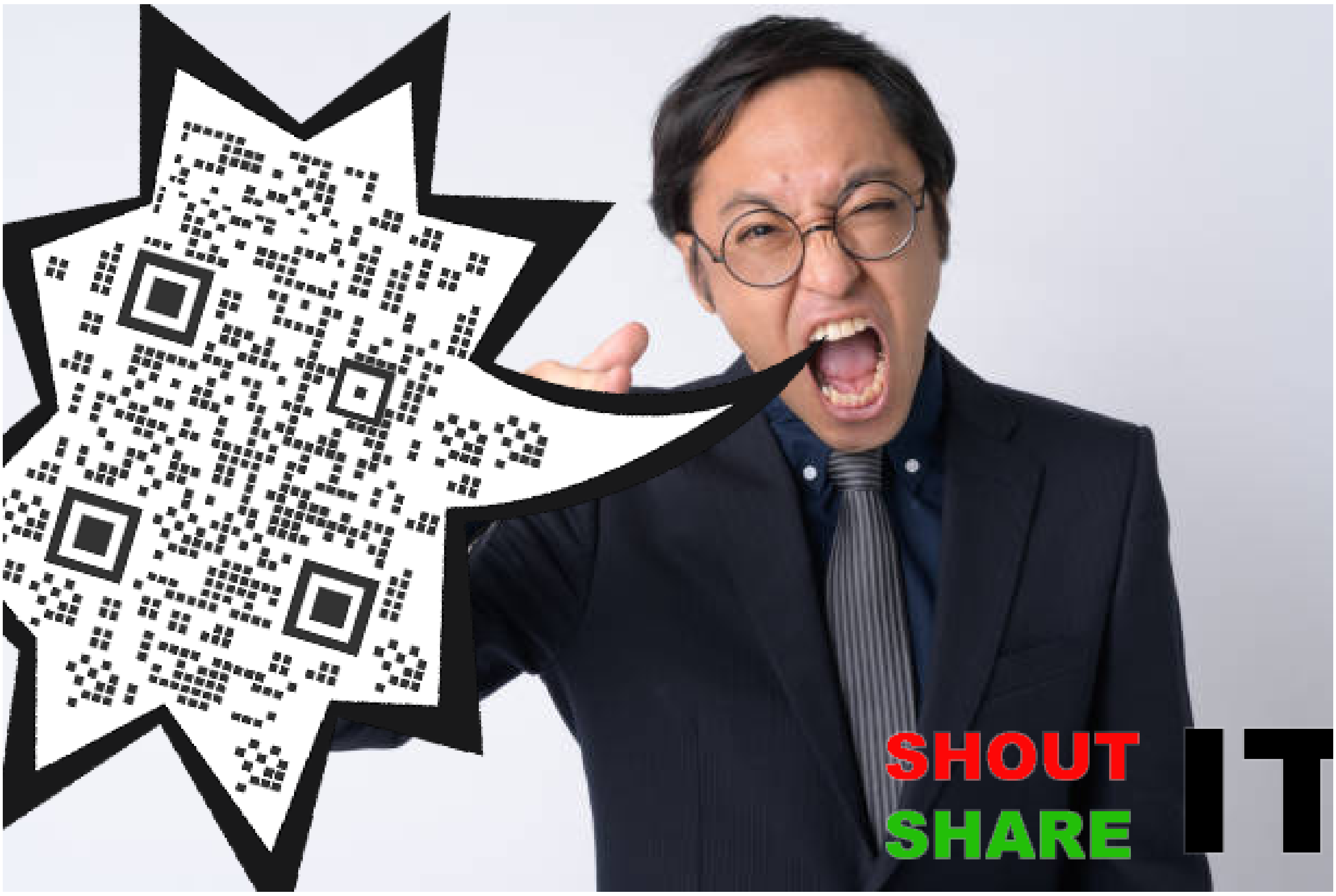
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JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

Remarks on the Botany of Madeira and Teneriffe. By Charles J. F. Bunbury, Esq., F.R.S., F.L.S. &c.

[Read March 6th and April 3rd, 1855.]

I offer to the Linnean Society the botanical observations made during my recent visit to Madeira and Teneriffe. Some apology may perhaps be necessary for writing anything on the botany of islands so well known and so much frequented. But, numerous as may be the botanists that have visited Madeira, I must say that I have been able to find but very little *published* information, of a satisfactory kind, relating to its vegetation. In the beginning of my visit to that island, I felt much the want of some memoir which might give me a general idea of its leading botanical features, and serve as a guide to my researches. Madeira is not like the neighbourhood of Cape Town, in which the botanist can hardly take a wrong direction, or make an unproductive excursion. I lost much time for want of such information as I have here endeavoured in some measure to supply. Mr. Lowe's researches in the island have indeed been so careful and persevering, that there is little likelihood of the detection of any absolute novelty, unless perhaps in the minuter cryptogamic tribes; but what he has published on the subject, as far as I am aware, consists chiefly in the description of some new species. A few general remarks on the Flora of

Madeira, prefixed to his 'Primitiæ,' are indeed useful, as are also his remarks on some particular species in the 1st volume of Sir W. Hooker's 'Journal of Botany;' and there are some excellent observations on Madeira botany by Dr. J. D. Hooker, in the 6th volume of the 'London Journal of Botany;' but all these still leave much room for further illustration of the subject. I have endeavoured to add something to the information hitherto published, in relation both to the distribution of species in the island, and to the connexion of its Flora with those of other countries, though my materials are insufficient for thoroughly working out either of these subjects.

My notes on Teneriffe must be considered as merely supplementary to the excellent accounts of that island by Von Buch, Webb, and Berthelot.

The first thing that strikes a botanist on landing at the capital of Madeira, is the thoroughly tropical aspect of the cultivated vegetation. The Banana, the Sugar-cane, the Coffee, the Guava, and the Custard-apple, are seen in all the gardens; the *Datura arborea*, *Poinciana pulcherrima*, *Linum trigynum*, *Bignonia venusta*, several Ipomæas and Passion-flowers, two or three species of *Hedychium*, the *Duranta Ellisia*, *Erythrina Corallodendron*, and *Cæsalpinia Sappan*, flourishing luxuriantly in the open air, delight the eye of a botanical visitor from more northern climates. On the lower slopes of that sunny amphitheatre of mountains which rises from the Bay of Funchal, most of the productions of the tropics are cultivated with success. The Papaw is frequent in the gardens, and ripens its fruit abundantly. *Pandanus odoratissimus* grows to a great size, and occasionally ripens fruit. The Bananas of Funchal, though not large, are of excellent flavour; the *Anona reticulata* arrives at great perfection; the Guava is half naturalized; and the Rose-apple is a common garden tree, attaining to great size and beauty.

In the fields, and in the little plots and terraces of soil which are cultivated with infinite industry amidst the basaltic rocks, we see the plants of the tropics mixed with those of the temperate zone. The Banana, the Sugar-cane, the Coffee, the Orange, and the Guava are frequently seen, in sunny nooks of the ravines, in company with the Peach, the Vine, the Fig, and the tall Italian Reed*. The Sugar-cane is grown to a considerable extent on the warm sunny slopes of the coast to the westward of Funchal, between that town and Camara dos Lobos; its peculiarly light and lively yellow-green colour makes it conspicuous even in a distant view. In that situation it flowers in February.

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* *Arundo Donax*, L.

Two of the characteristic field-crops in Madeira are the Sweet Potato (*Batatas dozes, Convolvulus Batatas*, L.?), and what is there called the *Inhame*, or Yam, which is an Aroideous plant (*Caladium nymphæifolium*?) with beautiful large leaves of a peculiarly soft and tender green. The Convolvulus thrives best in the lower and more sunny region, below the elevation of 1000 feet: being easily propagated, and yielding a large produce, it is of great value to the inhabitants; and, since the failure of the vine in particular, its culture is said to have been much extended. The Caladium, which requires a moist soil, is cultivated especially along the margins of the torrents, and up to a considerable elevation on the mountains.

The culture of the Cactus, or Opuntia (*O. Tuna*, DC. according to Mr. Lowe), has of late been much extended, and carried on with new zeal, since hopes have been entertained that the rearing of the *Cochineal* insect may prove a valuable branch of industry in Madeira, as it has in Teneriffe. Whatever may be the success of this speculation, it is certain that the plant thrives exceedingly in the coast region of Madeira, where it is indeed so well established, that it may almost be reckoned among the naturalized species.

When, leaving the beautiful gardens of Funchal, I began to search for the native vegetation of the neighbourhood, I at first experienced considerable disappointment. This was partly, indeed, owing to the season; for the winter has a much more decided effect on the condition of the vegetable world in that island, than might have been inferred from its latitude. The profusion of blossom in the gardens of Funchal, in December and January, is indeed strikingly contrasted with the scantiness of wild flowers at the same season In this latter respect, Madeira has little advantage over the south coast of France. Of the more peculiar and characteristic, and unquestionably native plants of the island, very few, comparatively, are winter flowerers; most of those which are to be found in blossom at that season are either evidently or probably naturalized.

Besides, cultivation has extended so far around Funchal, and has taken such entire possession of the soil, that one has far to go before reaching any good botanizing ground. The sea-cliffs are in most places inaccessible; sandy shores (which in most warm countries afford so many peculiar plants) there are none; and in whatever direction the botanist proceeds inland, he finds himself sorely hampered by far-stretching stone walls and paved roads. The majority of the wild plants that grow about Funchal, in the coast-region, are such as come under the common denomination of *weeds*, most of them wide-spread European species; together with some naturalized colonists from South America and the Cape.

One of the first excursions generally made from Funchal by strangers is that to Nossa Senhora do Monte, upwards of 1900 feet above the sea-level. This is an excursion very unprofitable to the botanist, although he will meet with a few Ferns on the walls by the roadside, and will notice, along the margins of the little watercourses, great abundance of a delicate *Commelyna**, a plant of an exotic aspect, and of a non-European family. This is one of the characteristic plants of the lower region of the south side of Madeira, and, together with *Ageratum conyzoides*, *Bidens leucantha*, *Gnaphalium luteo-album*, and *Oxalis corniculata*, is seen in all wet places, especially in the beds of torrents and on the margins of brooks and watercourses. All of the plants just enumerated are species very widely distributed.

One striking characteristic of Madeira is the rapidity with which exotic plants become naturalized. This process is going on so fast, that it is difficult, and is constantly becoming more difficult, to udge *what* plants are really native, and what are introduced. For example: a beautiful cherry-coloured *Oxalis* (*O. speciosa*?), from the Cape of Good Hope, was introduced into the island by a lady still living there, and is now thoroughly established as a wild plant, and very abundant in many places, not only in cultivated fields, but on rough, wild, broken ground amidst the fir plantations. So also the *Pelargonium capitatum* and the *Salvia pseudo-coccinea* are completely naturalized in various places. The *Datura arborea* and *Fuchsia coccinea* are rapidly establishing themselves: the former grows apparently wild, and forms whole thickets, on the bank of a stream in the Boa Ventura Valley; the Fuchsia grows like a native, and in great abundance, among the Vaccinium and other indigenous shrubs, on the hills near Santa Anna.

It is very probable that many other plants, of which the exotic origin cannot so easily be traced, may in like manner have been introduced into Madeira in modern times, through the agency, either voluntary or accidental, of man. Perhaps even the greater number of those South European species, which are the "weeds" of cultivated lands in Madeira, ought to be placed in the category of "colonists." Such are *Calendula arvensis* (one of the commonest winter-flowering plants about Funchal), *Setaria verticillata, Lathyrus sativus, Galactites tomentosa, Galium saccharatum, Echium violaceum, Anchusa Italica, Anagallis arvensis* var. *cærulea*, and many others. There are, however, very many plants, common to Europe and Madeira, the introduction of which cannot so easily be ascribed to the agency of man; of these I shall speak more particularly afterwards.

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* *C. agraria* (Kunth, Enumeratio Plantarum), if I am not mistaken.

Gomphocarpus fruticosus, a very common Cape plant, which seems to have spread widely through Africa and parts of Asia, grows wild in several places about Funchal, particularly amidst the volcanic cinders of the little cone called Pico de S. João. Its feathered seeds may easily have been transported by the winds from the continent of Africa. In spite of the wide distance between the two localities, there is no appreciable difference between the Madeira specimens and those from the Cape of Good Hope.

In speaking of the naturalized plants of Madeira, I must not omit to mention the Sweet or Spanish Chestnut, and the common Broom (*Cytisus scoparius*, DC.); both of which, it is said, are certainly known to have been introduced into the island, though now so well established as to have all the appearance of true natives, widely spread, and covering great tracts of ground.

On the sea-coast near Funchal there are a few localities where the purely native and peculiar plants may still be found. One of these is the spot long since mentioned by Mr. Lowe * as producing the rare *Chamæmeles coriacea*; namely the edge of the sea-cliff a little way east of the city, on the road to Santa Cruz and Machico. Here the *Chamæmeles* still grows, as well as the splendid plant commonly called the "Pride of Madeira" (*Echium fastuosum* ?), the *Plantago Maderensis*, Decaisne, and a shrubby Cassia (*C. bicapsularis*), which, though probably an introduced plant, is well established, and plentiful in many places along the cliffs. The pretty *Lavandula pinnata* is also to be found on the same part of the coast, on rocks above the Lazaretto. On the other side of Funchal, near the Ponta da Cruz, the rugged lava rocks surrounding that singular crater-like chasm which opens to the sea, produce a few interesting plants: the *Helichrysum obconicum* is abundant, a fine shrubby plant, very conspicuous from the contrast of its excessively white woolly leaves with the black lava; *Lotus glaucus* also grows there, and *Matthiola Maderensis*; this latter not in flower at the time of my visit, but showing the dry withered remains of its long seed-vessels. The most abundant maritime plant, however, here and on the sea-rocks near Funchal generally, is a fleshy-leaved Plantain, which appears to be merely an excessively luxuriant variety of *P. Coronopus.*

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* Linnean Transactions, vol. xvi.

The culture of the vine hardly extends above 2000 feet. Beyond this height there is still some cultivation, but it is in scattered patches, no longer so continuous and extensive as to exclude the native vegetation. The mountain sides are in part covered with open woods of chestnut, nowhere so thick as to prevent herbage from growing under them; in parts there are large plantations of Pinaster; but on the whole the general appearance of the upper region of the mountains, on the southern side of the island, is rather bare, and strikingly so when compared with the northern side. The above-mentioned Pinasters seem to have been mistaken by Spix and Martius* for *Pinus Canariensis,* which I never saw in Madeira. In the chestnut woods, and in the ravines of this region of the mountains, one meets with some of the characteristic plants of the island, such as *Hypericum grandifolium,* Choisy (*Androsæmum Webbianum,* Webb and Berthelot), *Cedronella triphylla,* Benth., *Sibthorpia peregrina,* and *Micromeria varia*; this last, indeed, a common plant on rocks, even down to the coast. The Sweet Violet (called *Viola Maderensis,* but which I do not see how to distinguish from *V. odorata*) grows in profusion, beginning at an elevation of about 1000 feet above the sea. *Vinca major* abounds here and there, but not far from houses or gardens, and probably naturalized. Of the *Amaryllis Belladonna,* which is said to be the most beautiful ornament of the chestnut woods, I saw only the leaves. There seems to be no doubt of its being the same species that grows at the Cape; its occurrence in two such distant localities is puzzling to account for on any theory of migration, unless we suppose it to have been purposely introduced; for its large bulbs would with difficulty be conveyed to great distances, either by any natural means of transport or by the unconscious agency of man. On the other hand, if we resort to the hypothesis of independent creations, it seems strange that a local plant, very fastidious as to soil and situation, should be common to the dry parched sands of the Cape Flats and the damp cloudy mountains of Madeira.

Of Ferns, the *Polystichum aculeatum* (*Aspidium angulare,* Sm.) and *Lomaria Spicant* (*Blechnum boreale,* Sm.) are very common in the chestnut woods; *Asplenium anceps,* Lowe, *Aspl. acutum,*

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* Travels in Brazil, vol. i.

Bory, and *Polypodium vulgare*, frequent on rocks in this as well as in the lower region; *Nephrodium affine*, Lowe, and *Polystichum falcinellum* (*Aspidium*, Sw.), more local, This last is an interesting plant, remarkable for its very rigid texture, and its resemblance at first sight to the leaves of a Zamia; I found it sparingly in the woods about the Jardim da Serra (Mr. Veitch's country house, about 2500 feet above the sea), and in a more dwarfish state amidst the crowning rocks of the Arrebentão Peak, at the elevation of more than 3800 feet. In general, the chestnut woods on the south side of the island are too dry and open to be rich in Ferns or Mosses. In many parts, particularly in the woods above N. S. do Monte, I observed that the trunks of the chestnut trees, though of considerable size, were quite clean and bare, without a moss, without even a lichen except minute crustaceous species.

It is only in some few deep and sheltered ravines that the cryptogamous plants are to be found in abundance and in fine condition, and that a few remnants are still to be seen of the primitive forests which seem to have formerly clothed the southern as well as the northern face of Madeira. Such is the case in the beautiful ravine commonly called the Little Curral, from which the Ribeiro de João Gomez descends to Funchal. I do not know any other place, so easily accessible from the city, so attractive to a botanist, and especially to a lover of Ferns. Here, *Woodwardia radicans*, *Adiantum reniforme*, *Pteris arguta*, *Cystopteris fragilis*, *Athyrium Filix-fœmina*, *Nephrodium elongatum*, *Davallia Canariensis* may all be found, with abundance of *Lycopodium denticulatum*. Here, too, are still growing a few trees of Vinhatico, *Laurus* (*Persea*) *Indica*, one of the beautiful Laurels of the native forests.

The fine ravine of the Santa Luzia torrent, at the head of which is a remarkable waterfall, is still more rich in Ferns; but though not many miles distant from the city, it is much less easy of access than the Little Curral. *Woodwardia radicans*, *Allantodia umbrosa*, and *Pteris arguta* grow in most luxuriant beauty about the foot of the waterfall, at an elevation of about 2600 feet above the sea. *Adiantum reniforme* is plentiful on the cliffs that bound the ravine; and *Ad. Capillus-Veneris*, which at Funchal grows close to the actual sea-shore, extends even up to the waterfall. In this one ravine, and in one day's excursion, I observed twenty-two species of Ferns.

The Tea-tree is cultivated with great success by Mr. Veitch at the Jardim da Serra, and its produce is of excellent flavour. At

Funchal he finds that it does not succeed. *Fuchsia coccinea* grows most luxuriantly at the Jardim, where Mr. Veitch cultivates it for food for cattle. He informed me that, in consequence of the scarcity of grass, the cattle are generally fed during winter on the leaves and young branches of trees or bushes, and that there is nothing which they eat with so much eagerness as the Fuchsia.

I observed that the Sweet Chestnut trees, which are cultivated here and there in the lower grounds in the neighbourhood of Funchal, retain most of their leaves through the winter, the foliage being partly green even in January, while those on the mountains are as completely deciduous as in Europe.

The highest parts of the southern mountains above the chestnut woods have a very bare appearance, and, at the season of my visit, exhibited very few plants in a recognizable state. Large spaces are covered with low stunted bushes of *Erica scoparia* and *Laurus Canariensis*; the margins of the little mountain streams are fringed with Brambles (*Rubus fruticosus*?) and a few Ferns, particularly *Gymnogramme Lowei* and *Lomaria Spicant* *; the earthy banks are covered with small *Jungermanniæ*, and the rocks with crustaceous Lichens, among which *Lecidea geographica* is abundant and conspicuous. A very handsome bushy white *Stereocaulon* grows in profusion on the rocks. Mosses are not plentiful in this bare and exposed region, with the exception of *Polytrichum nanum* and the ubiquitous *P. juniperinum*.

When we cross the watershed of the mountains, and begin to descend towards the northern side of Madeira, the appearance of the vegetation changes remarkably. In consequence, probably, of the less attractive climate, and the frequency of rains and storms, the quantity of cleared and cultivated land is comparatively very small on the northern side of the island, and the greatest part remains in its original state, while this same abundance of moisture promotes a luxuriant growth of native vegetation. There is, indeed, on the southern side of the watershed one great valley, the Serra d'Agoa, which sends its waters to the south, and which yet remains as much in a state of nature, and is as richly wooded, as any of the northern valleys. But the upper part of the Serra d'Agoa valley, to which this observation applies, is a basin of immense depth, almost surrounded by high mountains of excessive steepness, and in great measure sheltered from the effects of the southern winds and sun by a ridge which, branching

* These two ascend to upwards of 3800 feet.

from the central range, projects from E. to W. almost across the valley. The circumstances are therefore exceptional. As a general rule, the native forests characterize the northern face of the island.

These evergreen woods are remarkably beautiful and picturesque, though they have not the overwhelming luxuriance and almost awful grandeur of the tropical American forests. They are principally composed of four species of Laurel: the Til, *Laurus* (*Oreodaphne*) *fœtens*; the Vinhatico, *Laurus* (*Persea*) *Indica*; the *Laurus Canariensis*, Webb and Berth.; and the *Laurus* (*Phœbe*) *Barbusana*. All these are noble trees, of great size, of free and picturesque growth, and of rich, massy, glossy foliage. Old trees of Til and Vinhatico*, with rugged and cavernous trunks, are as fine objects as any trees I have ever seen. These two species predominate in the woods of the Serra d'Agoa valley, while the *Laurus Canariensis*, which likewise grows to a very large size, is the prevailing tree in those of Ribeiro Frio and the Metade. Another beautiful tree of these forests, but a less abundant one, is the Folhado, *Clethra arborea*, the wood of which is much used for hammock-poles and walking-sticks. The undergrowth consists mainly of two Heaths, *Erica scoparia* and *arborea*, and the Madeira Whortleberry, *Vaccinium padifolium*, Sm.†; with *Hypericum grandifolium*, and a profusion of Ferns. The *Erica arborea* grows really to a tree, and a very picturesque one, but I did not myself see in Madeira any specimens of it as large as some in the wood of Agua Garcia in Teneriffe. All the old trees in the Madeira woods are most beautifully draped with ferns (especially *Davallia Canariensis* and *Polypodium vulgare*), mosses and lichens.

Madeira is famous for its abundance of Ferns. This character is deserved chiefly by the northern side of the island, which, owing to its wild and wooded condition and very moist climate, is indeed a choice situation for these beautiful plants. The southern side, more exposed to the sun, may perhaps have always been less suited to them; and the destruction of the woods, and extensive spread of cultivation, have left comparatively few localities favourable to their growth. On the northern slope they grow in surprising profusion. In all the ravines which intersect that coast we see them clothing the rocks and shady banks, the roots and trunks of trees, the margins of the innumerable rapid streams, and the moist and mossy walls. Even in the villages they abound. The beautiful Hare's-foot Fern, *Davallia Canariensis,* and the *Polypodium vulgare,* appeared to me the most generally common ferns throughout the island; they are frequent even in the immediate neighbourhood of Funchal; and on the northern side of the island, there is hardly a damp wall or an old mossy tree on which they do not flourish. Near the mouth of the S. Vicente river I saw them growing (in a stunted condition certainly) among the loose stones of the actual sea-beach. It is on old trees in the mountain woods of Serra d'Agoa and Ribeiro Frio that they are most luxuriant and beautiful; and there they ascend to an elevation of at least 3000 feet above the sea-level.

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* The young stems of the Vinhatico have a very smooth bark, but that of the old trunks is peculiarly rugged and knotty.

† *V. Maderense*, DC.

I will here bring together the rest of the observations I made on the Ferns of Madeira.

Nothochlæna lanuginosa, R. Br. In the crevices of old walls here and there in the city of Funchal.

Gymnogramme Lowei, Hooker. On wet rocks near the waterfall of Santa Luzia, elev. about 2600 feet. On the margin of a small stream on the Arrebentão, a little below the summit, the elevation of which is 3844 feet *; also at Ribeiro Frio. Its resemblance at first sight to *Nephrodium molle* is very striking.

Gymnogramme leptophylla, Desvx. In the crevices of walls near the church of S. Antonio, on the south side of the island; but the young plants (for it appears to be an annual fern) were only beginning to appear before I left Madeira.

Acrostichum squamosum, Swartz? (*A. paleaceum,* Hook. and Grev.). Ribeiro Frio, very sparingly, at the roots of decayed trees, by the *levada* or aqueduct.

Lomaria Spicant, Desv. Common in the mountain woods on both sides of the island, also on shady banks in lanes; more common, and descending to a lower level, on the north side.

Woodwardia radicans, Sm. In great plenty on the plateau of Santa Anna, about 1000 feet (more or less) above the sea, on shady hedge-banks and the margins of streams; this was the lowest level at which I saw it. Very fine at Ribeiro Frio (elev. about 3000 feet) and in the Metade Valley. On the south side: on the margins of streams descending from the Arrebentão; in the Little Curral, below the mill; and in great beauty about the Santa Luzia waterfall. It is certainly one of the handsomest of ferns. It is very remarkable, that, among the impressions in the bed of fossil leaves discovered by Sir C. Lyell in the ravine of

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* Captain Vidal's Map.

S. Jorge, I observed some fragments closely agreeing in form and venation with the leaflets of this Woodwardia.

Pteris aquilina, L. Very common in the island.

Pteris arguta, Vahl. In the wet shady ravines, very common on the north side of the island, down nearly to the sea-level; extremely abundant and fine at Ribeiro Frio (3000 feet), and in the woods at the head of the Serra d'Agoa valley. On the south side: in great plenty and luxuriance in the Santa Luzia ravine; in a dwarf state on rocks in the Little Curral.

Cheilanthes fragrans (Hook. Spec. Fil.: Ch. *Maderensis*, Lowe). On old walls at Funchal, sparingly; sometimes in company with *Nothochlæna lanuginosa.*

Adiantum reniforme. Under the shade of overhanging rocks, and on rocks constantly wet with the spray of waterfalls and torrents; plentiful in many of the ravines of the north side of the island, mostly at a low or moderate level, but certainly not (as represented by M. Höll) confined to the region of the Cacti. At Ribeiro Frio (though very sparingly), and on the precipice immediately below Pico Grande, at an elevation probably exceeding 4000 feet. Very local on the southern side, though plentiful in some particular ravines, especially in that of Santa Luzia.

Adiantum Capillus-Veneris. Very common on both sides of Madeira, chiefly in the coast region, but ascending to nearly 2600 feet in the Santa Luzia ravine. Particularly fine and luxuriant in some of the wet ravines of the north coast.

Asplenium palmatum. Very plentiful along the northern coast, generally below, or not much above, 1000 feet of elevation, descending indeed to a very low level; but I saw it also in the mountain woods at the head of the Serra d'Agoa valley, and I was told it had been found at Ribeiro Frio. I never saw it to the south of the central range of mountains.

Asplenium anceps, Lowe. Seemingly very general in the island, from the rocks of the coast region (between Funchal and Camara dos Lobos) to the Laurel forests at 3000 feet and even higher. The figure in the 'Icones Filicum' represents an *extreme* specimen; the ordinary Madeira state of the plant is much more like *A. Trichomanes.*

Asplenium monanthemum, Sm. Much more local than the preceding, but abundant in some places: particularly abundant and fine at Ribeiro Frio (about 3000 feet). In some lanes near S. Jorge and Santa Anna, perhaps below 1000 feet. On the south side of the mountains: in company with *Woodwardia radi-*

cans and *Gymnogramme Lowei*, on the shaded margins of small streams below the Arrebentão Peak.

Asplenium marinum. Frequent on the north coast, especially near the mouth of the S. Vicente River *. I nowhere saw it much above the sea-level. It has been found on the south coast, at Camara dos Lobos and Santa Cruz.

Asplenium Canariense, W. On moist mossy stone walls and rocks, on the north side of the island, in many places: Punta Delgada, Boa Ventura, Arco de S. Jorge, and in the ravines that run down to Fayal; most commonly at a moderate elevation, like *A. palmatum.* I understand it has been found at Ribeiro Frio. To the south of the dividing range it is wanting or very rare.

Asplenium lanceolatum, Huds. On walls near N. S. do Monte, and in one or two other places not far from Funchal.

Asplenium acutum, Bory (according to Webb and Berthelot, and to Newman, Brit. Ferns, ed. 3) (*A. productum*, Lowe). One of the most common Ferns throughout Madeira, from the coast up to at least 4000 feet of elevation. In the neighbourhood of Funchal it is the most common of all. It is very difficult to decide whether this be really distinct from *A. Adiantum-nigrum.* The latter is a plant so excessively variable, that it seems hardly possible to set limits to its sportiveness; but on the other hand, much as the plant of Madeira and Teneriffe varies in size and development, I have never seen it assume exactly the common appearance of *Adiantum-nigrum.* The differences are not owing merely to luxuriance, for some of my Madeira specimens, not above 8 inches high, have all the characters of *acutum* strongly marked, while some of *Adiantum-nigrum* from Ireland, 14 or 15 inches high, have all the characteristic marks of *that* species.

Athyrium Filix-fœmina. Frequent in moist and shady places on both sides of Madeira.

Allantodia umbrosa, R. Br. In very wet and shady ravines: Ribeiro Frio, Metade Valley, and near the Santa Luzia waterfall. A very beautiful Fern.

Scolopendrium vulgare, Sm. Seemingly rare in Madeira: I saw it only in the Santa Luzia ravine, where it grows sparingly and small.

Ceterach officinarum, W. On walls here and there in the neighbourhood of Funchal. It is remarkable, that this, which is one of the most common Ferns in the south of Europe, should occur so sparingly in Madeira.

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* Some of the specimens gathered here are as much as 2 feet high.

Polystichum falcinellum, Sw. In the chestnut woods at Jardim da Serra, and amidst the crowning rocks of the Arrebentão (see before, p. 7).

Polystichum aculeatum (*Aspidium angulare*, Sm.). Very common in the mountain woods; also in lanes and hedge-banks on the north side of the island. I did not see in Madeira any specimens referable to *Aspidium lobatum*, Sm., or even approaching to it.

Nephrodium molle. On wet banks and under dripping rocks, in the neighbourhood of Funchal; mostly, if not exclusively, below 1000 feet of elevation.

Nephrodium affine, Lowe. Here and there in the chestnut woods, at 2000 feet and upwards, but sparingly. It does not appear to me distinct from *N. Filix-mas*; but whether species or variety, I have found in North Wales (near Dolgelly) a Fern perfectly agreeing with the *N. affine* of Madeira.

Nephrodium elongatum, Lowe. Common in moist shady places in the mountain woods; particularly fine by the side of the *levada* near Ribeiro Frio. Besides the characters pointed out by Hooker and Greville, and by Lowe, as distinguishing this from *N. Filix-mas*, the stalk, below the first pinnæ, is much longer in proportion, so that the general form is more like *N. cristatum* or *dilatatum* than *Filix-mas*; and the paleæ on the midribs of the pinnæ are of quite a different shape.

Nephrodium fœnisecii, Lowe. Very plentiful in the Laurel forests of the Metade Valley and Ribeiro Frio; also above the forests, amidst the bushes of *Vaccinium padifolium*, Sm., quite up to the Poizo Pass, nearly 4600 feet above the sea.

Cystopteris fragilis. Very abundant on wet and shaded rocks and banks, from very near the level of the sea (on the north coast) to 3000 feet and upwards in the Laurel forests.

Davallia Canariensis, Sm. One of the most common Ferns in Madeira (see p. 7).

Trichomanes speciosum, W. (*T radicans*, var., Hook. Sp. Fil.) On very wet shaded rocks, by the side of the *levada* or aqueduct, between the Ribeiro Frio and Metade valleys; very sparingly. The specimens gathered here are much less luxuriant than those I collected in the wood of Agua Garcia, in Teneriffe; the stipes shorter, and more broadly winged.

Hymenophyllum Tunbridgense, Sm. In the same locality with the *Trichomanes*, and rather more plentifully. All the Madeira specimens I have seen are well-marked examples of *H. Tunbridgense*, not approaching to *H. Wilsoni*.

The Ferns of Madeira altogether amount to 40 species, according to Mr. Lowe; and it is not very likely that, after his zealous and persevering researches, carried on for many years, any new ones should remain to be discovered. Taking the number of phænogamous plants, on the same authority, at about 700, the proportional number of Ferns is nearly twice as great as in Britain, though still very small if compared with the proportion in many of the Pacific islands, or in St. Helena. The Canary Islands, with a much larger phænogamous flora, have, according to Webb and Berthelot, only 34 Ferns.

The Azores * have 28 Ferns to about 400 flowering plants. Of the 40 Madeira Ferns, 15 at least are found in Britain †; perhaps more, but there may be different opinions as to the distinctness of some of the species. I am myself strongly inclined to believe that *Asplenium anceps*, Lowe, is only a variety of *A. Trichomanes*, and *Nephrodium affine*, Lowe, of *N. Filix-mas*. *Asplenium acutum*, Bory, whether it be a true species, or a variety of *A. Adiantum-nigrum*, appears to have been found in Ireland, and is therefore included in the 15. Of the Ferns of the Canary Islands, *Hymenophyllum unilaterale*, W. ‡ (=*H. Wilsoni*, Hook.), *Pteris longifolia*, *Pteris caudata* §, and *Cheilanthes pulchella*, have not, as far as I know, been discovered in Madeira. On the other hand, the Madeira Ferns, which appear to be strangers to the Canaries, are

Polypodium drepanum.
Polystichum falcinellum.
P. frondosum.
Nephrodium affine.
N. fœnisecii.
Gymnogramme Lowei.
Scolopendrium vulgare.
Acrostichum squamosum.
Dicksonia Culcita.

The Ferns found in the Azores, and not in Madeira, are *Osmunda regalis*, *Ophioglossum vulgatum* (if *O. Lusitanicum* be really distinct from it), and perhaps *Hymenophyllum Wilsoni*. A much greater number belong to Madeira, and not to the Azores.

Dr. Hooker || enumerates 5 species of Ferns which are common

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* Watson in Hook. Lond. Journ. Bot. vol. iii. p. 615.

† Excluding the Channel Islands, which do not *naturally* belong to this country.

‡ This may likely enough exist in Madeira, and have been confounded with *H. Tunbridgense.*

§ There may be some doubt, whether the Canary plant so called be distinct from *Pt. aquilina.*

|| London Journ. Bot. vol. vi. *Gymnogramme Lowei* should be added to the list, according to Lowe, Primitiæ, Appendix A, Note 4; he says it has been found in Jamaica.

to Madeira and the West Indies, but not found on the continent of Europe, nor in North Africa. The identity, however, of *Asplenium Canariense* with *A. furcatum*, and of *Trichomanes speciosum* with *T. radicans*, may be open to some dispute.

Polypodium drepanum, *Polystichum falcinellum* and *P. frondosum* appear to be really peculiar to Madeira; while the Canaries have, as it seems, no peculiar Fern except *Cheilanthes pulchella*; and the Azores none at all. Some species which are common to Madeira and the Canaries are confined to these two groups, or only straggle into the westernmost part of Europe, and do not reach the Azores; such are *Davallia Canariensis*, *Adiantum reniforme*, *Nephrodium elongatum*, and *Asplenium Canariense* (if it be distinct from *A. furcatum*). On the other hand, *Dicksonia Culcita* is common to Madeira * and the Azores, and peculiar to them. Species common to all three groups, and scarcely to be found elsewhere, are *Allantodia umbrosa*, *A. axillaris*, and *Pteris arguta*.

It is worthy of notice, that, with the single exception of *Ophioglossum Lusitanicum*, all the Madeira Ferns are *Filices Gyratæ*, or *Polypodiaceæ*. There are no *Osmundaceæ*, no *Schizæaceæ*, no *Gleicheniaceæ*. The absence of *Osmunda regalis*, a plant so widely distributed, and which is found in Northern Africa and in the Azores, is perhaps to be accounted for by the want of marshes and pools. It is also remarkable, that, with so large a number of Ferns, Madeira has only two *Lycopodiaceæ*. In general, the same localities are favourable to both families. *Lycopodium* (*Selaginella*) *denticulatum* abounds everywhere in the mountain woods and deep shady ravines, and even carpets the moist stone walls close to the sea, on the north coast; in the neighbourhood of Funchal it is less frequent. *Lycopodium suberectum*, Lowe, appears to be rare, and I never met with it.

The Mosses, Hepaticæ, and Lichens of Madeira offer a fine field of research to a botanist who has plenty of leisure to search for them. They are very abundant and beautiful in the Laurel woods of the central range, but I had not time to do more than collect a few of the more conspicuous kinds. The following are the principal Mosses and Lichens that I observed in the island:—

Fissidens serrulatus, Bridel. Abundant on very wet and shady banks in the Laurel forests; in fruit in a small gully amidst the chestnut woods above N. S. do Monte.

Hypnum purum. On the ground in the Laurel forests, Ribeiro Frio, and at the head of the S. Vicente valley. I did not find it in fruit, but the stems and leaves agree so well with our common *purum*, that I have little or no doubt of its identity.

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* In Madeira, however, it is very rare.

Hypnum Illecebrum, L.? Common on the mountains, on moist shady banks; but barren.

Hypnum alopecurum, L. Ribeiro Frio; barren.

Hypnum strigosum? Moist rocks, Ribeiro Frio; finely in fruit, February 11.

Neckera crispa, Hedw. In great profusion and beauty on old trees in the Laurel forests, especially at Ribeiro Frio, often entirely clothing the trunks; bearing ripe capsules in January.

Neckera pennata? Sparingly on old trees in the forests below Pico Grande; not in fruit.

Leptodon longisetus, Montagne (in Webb and Berthelot, Hist. Nat. Canar.). On old *Til* trees below the precipice of Pico Grande; very sparingly in fruit.

Leucodon sciuroides var.? (The capsules roundish-ovate, shorter and broader than in any other specimens I have seen of *L. sciuroides*; but all the other characters agree with the variety called *L. Morensis* by Bridel.) On trees near Santa Anna, and on moist rocks in the Little Curral; bearing fruit plentifully in January.

Polytrichum juniperinum. Very common on the upper parts of the mountains, especially in the bare region above the forests.

Polytrichum nanum. Common on the mountains.

Bartramia stricta, Brid. On moist rocky banks on the mountains about the Great Curral, but rather sparingly. (In Teneriffe I found it in great abundance.)

Bartramia rigida, Mont. (*Philonotis rigida*, Brid.) On wet rocks near Santa Anna, and at Ribeiro Frio.

Trichostomum polyphyllum, Turn. (*Ptychomitrium*, Mont.) Abundant on rocks at Ribeiro Frio.

Sticta macrophylla. Plentiful on rocks at Ribeiro Frio, and fructifying abundantly.

Sticta damæcornis. On old mossy trees, Ribeiro Frio.

Sticta aurata. On trees, Ribeiro Frio; very sparingly in fruit. The upper side of the frond, when fresh and growing, is of a rather bright green colour, much like that of *S. macrophylla*; but after it has been dried some time, it turns to a reddish-brown, as represented in Von Martius's 'Icones Plant. Crypt. Brasil.'

Parmelia caperata. On rocks.

Parmelia parietina. On rocks, especially near the sea.

Parmelia plumbea. On rocks, Great Curral.

Parmelia affinis (*Squamaria*, Hook. Brit. Fl.). Among moss on trees near Santa Anna.

Borrera leucomela, Ach. On old trees at Ribeiro Frio, abundant, but barren.

Borrera flavicans, Ach. On trees in the mountain forests.

Ramalina scopulorum ? On rocks, Great Curral.

Usnea barbata. Extremely common on trees and shrubs in the mountain forests.

Usnea articulata. In the forests at the head of the Serra d'Agoa valley.

Alectoria Canariensis ? On trees and shrubs in the above-mentioned forests.

Cladonia rangiferina (a variety of rather small growth, with the branchlets scarcely bending down). Frequent on open ground on the mountains, even below 2000 feet of elevation, as for instance near the Palheiro.

Stereocaulon paschale ? Very abundant on rocks on the mountains, above 2000 feet.

Sphærophoron —— ? On rocks in the Laurel forests.

Above the Laurel forests, in ascending from Ribeiro Frio to the Poizo Pass, are extensive low thickets of the *Vaccinium padifolium* (or *Maderense*), which is here as thoroughly a social plant as the *V. Myrtillus* with us; it covers the upper slopes and plateaux of the mountains to a great extent, and is very conspicuous in January and February, when its foliage assumes a rich vinous red colour. It ascends, in a more scattered manner, to the top of the Poizo Pass, 4560 feet above the sea; while, on the north coast, it grows in the ravines about Santa Anna, at an elevation scarcely exceeding 1000 feet. *Erica arborea* also is pretty plentiful about Santa Anna. On the south side of the island it is confined to much higher regions, and is by no means as general as *E. scoparia*. *Myrica Faya* (*Faya fragifera*, Webb and Berth.) abounds, particularly along the cliffs of the northern coast, between S. Vicente and S. Jorge.

Two large and remarkable species of *Sempervivum* form, by their size, abundance, and peculiar appearance, very conspicuous features in the botanical scenery of Madeira: one of them in particular (*S. tabulæforme*), spotting the rocks with its broad, flat, compact rosettes of light green leaves, has a very singular effect. Both are exceedingly plentiful along the north coast, on the bare precipitous rocks of all the ravines and headlands; they abound also in the ravine of Santa Luzia; and *S. glutinosum*, the more general of the two, is frequent in various places on the southern coast.

The flora of Madeira seems to be made up of three principal elements: the first, and numerically much the greatest, portion consisting of South-European, or Mediterranean plants; the second, of plants characteristic of the *Macaronesian* region (as Mr. Webb has named it), that is to say, plants either peculiar to Madeira, or common to it and the Canaries or Azores, but not natives of any of the continents. The third division consists of tropical or subtropical species, American or Indian, or, in some few cases, African, but not European; most, if not all of these, are probably introduced plants.

1. The large proportion of South-European plants in Madeira—480 out of less than 700 phænogamous species*—is very striking; and the space they occupy is not less remarkable than the number of generic and specific forms. In the lower region of the southern side especially, although the climate and the cultivated vegetation are nearly tropical, the general aspect of the wild plants constantly reminds one of the Mediterranean. A large proportion of these South-European species, it is true, are plants of cultivated ground, or of road-sides, and may have been introduced accidentally since the island has been colonized by Europeans. But there are others, such as *Cotyledon Umbilicus*, *Lavandula Stœchas*, *Salvia clandestina*, *Psoralea bituminosa*, *Ruta angustifolia*, *Phagnalon saxatile*, DC., the sea-side variety of *Plantago Coronopus*, and many more, to which this supposition is less applicable; and the number altogether seems too great to be explained by mere accidental transport through the agency of cultivation. One is rather tempted to speculate on the operation of some greater and more extensive cause, and to think of the bold hypothesis of Bory de St. Vincent and Edward Forbes, concerning the former existence of an *Atlantic Continent*, by which the three *Macaronesian* groups† might have been connected with western Europe and north-western Africa. Supposing the existence of such a continent, the presence of so great a proportion of plants common to Europe and the three groups aforesaid would be easily and simply explained, as they might have migrated by degrees, in the course of ages, by this *overland route*; whereas, in many cases, it is difficult to understand how they could have crossed the great breadth of sea at present

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* J. D. Hooker, in 'London Journal of Botany,' vol. vi. p. 126.

† Namely, Madeira and Porto Santo, the Canaries, and the Azores.

intervening. This remark applies, of course, equally, whether we suppose species to have migrated from Europe to the islands, or from the islands to Europe. There are instances in which the latter supposition seems the more probable. *Erica arborea*, for example, though widely spread through the south of Europe, nowhere (I believe) predominates so remarkably, or grows to so extraordinary a size, as in Madeira and the Canaries; whence one is tempted to conclude, that these islands were its true original native country. It is doubtless within the limits of possibility, that the small seeds of this plant may have been transported by violent winds across the intervening sea; but the migration would be much more easily explained on the hypothesis of a former land communication.

On the other hand, there are botanical anomalies difficult to explain on this supposition. One would have expected, if such a communication had existed, that the plants common to Europe and Madeira would have been more particularly those of the *west* of Europe; whereas, in fact, the great majority of them are species general through the Mediterranean region; and few, if any, of the more characteristic plants of Spain and Portugal occur in Madeira. In particular, that island seems entirely to want the *Cistus ladaniferus* (which is described as covering leagues and leagues of country in Portugal), and indeed all the *Cisti*, as well as *Erica ciliaris*, *Erica vagans*, and a great number more of the most characteristic *west*-European species. Dr. Hooker* has already remarked the singular fact, that out of the 480 European species common to Madeira, only 170 are found in the neighbourhood of Gibraltar, although this latter locality has as many as 456 indigenous plants. It is puzzling to understand how so many of the 480 (most of them common South-Europe plants), in their supposed migration from Europe to Madeira, or *vice versâ*, should have *missed* Gibraltar.

Again, one of the prominent botanical characters of the south of Europe is the great number and variety of *Ophrydeæ*, especially of the genera *Orchis* and *Ophrys*. A striking contrast in this respect is presented by the *Macaronesian* groups, which are remarkably poor in Orchids. Supposing a former connexion by intervening land, one would have expected to meet with many European species of this, as of other families.

On the whole, I can hardly say that the botanical evidence afforded by Madeira, and the other groups in question, in their present state, gives very decisive support to the theory of an

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* In London Journal of Botany, vol. vi.

Atlantic continent. It is probable that the botanical character of the lower parts of those islands has been very materially changed since they were first occupied by Europeans, and we can hardly now hope to determine with precision how much of the European element of their flora is due to transport by winds or by birds, how much to the indirect agency of man, and how much to other causes.

2. The second, and most interesting element of the flora of Madeira, consists of *Macaronesian* plants; species either peculiar to that island, or common to it with the Canaries, or with the Azores, or with both, but confined to those groups. To this category belong several of the Ferns already enumerated, and the following phænogamous plants may serve as further examples*:—

I. PLANTS APPARENTLY PECULIAR TO MADEIRA.

Sinapidendron frutescens, Lowe.

Matthiola Maderensis, Lowe (the distinctness of this species may perhaps be doubtful).

Lotus glaucus, Soland.

Chamæmeles coriacea, Lindl.

Sempervivum glutinosum, Soland.

S. tabulæforme, Haw.

Saxifraga Maderensis, Don.

Helichrysum obconicum, DC.

H. melanophthalmum, DC.

Calendula Maderensis, DC.

Senecio crassifolius, *var.* β, DC. (*S. incrassatus*, Lowe.)

Tolpis pectinata, DC.

T. macrorhiza, DC.

T. fruticosa, DC.

Sonchus ustulatus, Lowe.

Musschia aurea, DC. (= *Campanula aurea*, L.)

Sibthorpia peregrina, L. (= *Disandra prostrata*, Linn. fil.)

Echium fastuosum.

Sideritis Massoniana, Benth.

Teucrium betonicum.

Plantago Maderensis, Decaisne (is it really distinct from *P. arborescens*?).

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* I am not at present able to give complete lists of the plants comprehended in these several categories, but must content myself with enumerating a few conspicuous examples.

Obs.—The number of species of flowering plants *peculiar* to Madeira is stated* at 85; but this number may probably be rather too high; at least, the distinctness of several of Mr. Lowe's new species appears doubtful. In fact, in all estimates of botanical statistics, we are met at every step by the difficulty of deciding what *are* distinct species. The differences of opinion among eminent botanists on this point, and the want of anything like a fixed rule, throw an uncertainty upon all numerical comparisons of the floras of different countries.

II. Plants common to Madeira and the Canaries, and confined to them.

Cheiranthus mutabilis.
Hypericum floribundum.
H. glandulosum.
Geranium anemonifolium.
Rhamnus glandulosus.
Celastrus cassinoides.
Phyllis Nobla, L.
Clethra arborea (found in the Canaries, according to Von Buch).
Globularia longifolia, Soland.
Lavandula pinnata, L.
Teucrium heterophyllum.
Micromeria varia, Benth.
Cedronella triphylla, Benth.
Laurus Canariensis, Webb and Berth.
L. (*Phœbe*) *Barbusano.*
L. (*Oreodaphne*) *fœtens.*
Euphorbia piscatoria.
Carlowitzia salicifolia, Mœnch.

III. Plants common to Madeira and Azores, not found in Canaries.

Vaccinium padifolium, Sm. (= *V. Maderense*, DC.)

Ilex Perado, Soland. (In the Azores, according to Watson, in 'Hook. Lond. Journ.' vol. iii. The *Ilex Perado* of Von Buch's list of Canary plants is *I. Canariensis*, Webb and Berth.)

Melanoselinum decipiens, Hoffm.

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* Hook., Lond. Journ. Bot. vol. vi. p. 126.

IV. PLANTS COMMON TO ALL THE THREE GROUPS, SCARCELY FOUND ELSEWHERE.

Ranunculus cortusæfolius (= *R. grandifolius*, Lowe).
Hypericum foliosum, Soland. (= *H. grandifolium*, DC.; see Watson in 'Lond. Journ. Bot.' iii. 588).
Frankenia ericifolia, Chr. Smith.
Faya fragifera, Webb (= *Myrica Faya*, Soland.).
Persea Indica, Spreng.
Ruscus androgynus, L.

The Madeira plants belonging to this Macaronesian flora are inhabitants either of the sea-cliffs, or of the mountain woods and rocks in the interior, here and there descending along the deep rocky ravines towards the coast. From the region lying between the actual sea-cliffs and the upper limits of vine culture, on the southern side of the island, they have been mostly expelled by cultivation or by plants of European origin. *Micromeria varia* is perhaps more generally diffused through the island than any other phænogamous species of this peculiar flora, growing on almost all the rocks, as well near the coast as in the ravines of the mountains. *Davallia Canariensis* is another very general Madeira plant which may fairly be included in this category, since its head-quarters are evidently in Madeira and the Canaries, and it appears a straggler in Europe, where it is confined to the corner nearest to the islands in question. The most remarkable and striking features of this flora are the trees which compose the principal part of the native forests, namely the four species of Laurel, and the *Clethra arborea*; the more remarkable, because they appear to have no affinity with the flora of the neighbouring continent of Africa. The singular fact of the absence of *Laurineæ* from tropical Africa was long since pointed out by Mr. Brown, and has been confirmed by subsequent researches. At the Cape of Good Hope, indeed, there is a solitary species* (*Ocotea bullata*), and it is worth notice that this resembles the *Til* of Madeira and the Canaries in the qualities of its wood. Otherwise, very little analogy can be perceived between the truly indigenous flora of Madeira and that of South Africa.

The genus *Erica*, indeed, holds a conspicuous place in the floras of both these countries, but in very different ways. Madeira has two species only of Heath, but these cover a vast extent of ground, and form most conspicuous features in the physiognomy of vegetation. At the Cape, on the other hand, the species of *Erica* are almost innumerable, but none of them are very conspicuously abundant, nor cover much ground. The large Sempervivums of Madeira (*S. glutinosum* and *tabulæforme*) remind one of the *Crassulaceæ* of South Africa, and are perhaps in reality the closest link between the two floras.

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* Besides the anomalous *Cassytha*.

The *Clethra arborea*, an outlying species of a genus otherwise entirely American, is very remarkable. The *Vaccinium*, which is one of the most characteristic plants of Madeira, likewise deserves notice, on account of the rarity of that genus in Africa. Four species indeed are recorded from Madagascar, but not one, as far as I know, from the continent of Africa. *Vaccinium* indeed is principally an American genus*, though not as strictly so as *Clethra*.

The Madeira flora, at least the non-European element of it, has much of a fragmentary character; made up of a few species from each of a great number of families and genera, none (unless perhaps the Ferns and the *Cichoraceæ*) having any remarkable numerical preponderance. Moreover, the families richest in species are not (with the exception of the Ferns) those which have the greatest influence on the physiognomy of the vegetation. In the flora of the Canaries, on the other hand, there is a much more decided preponderance of particular families and genera.

3. The plants composing the third portion of the Madeira flora, namely such as appear to be immigrants from tropical countries, or from the southern hemisphere, are comparatively few in number, but several of them are conspicuous from their abundance. Among the number are *Bidens leucantha*, *Ageratum conyzoides*, *Commelyna agraria* (?), *Gomphocarpus fruticosus*, *Pennisetum cenchroides*, *Solanum Pseudo-capsicum*, *Cassia bicapsularis*, *Amaryllis Belladonna*, *Sida rhombifolia*, *Achyranthes argentea*, *Chenopodium ambrosioides*; not to mention others more evidently and recently introduced (see pp. 4, 5). Most of those above enumerated are plants widely diffused† over the warmer parts of the world, and several possess evident facilities for spreading themselves, either by the appendages of their fruits, seeds, or inflorescence, or by their rooting stems.

Seeing the rapidity with which exotic plants of late introduction naturalize themselves in Madeira (of which I have already given some instances), we may fairly suppose that the plants included in this category are not strictly indigenous, but have been introduced since the island has been brought, through human agency, into communication with America and with the southern hemisphere.

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* Out of 85 species enumerated by DeCandolle, 62 are peculiar to America, North or South.

† The *Amaryllis* is an exception.

Some of the Madeira plants might almost equally well be classed under this division or the first; for, though frequent in southern Europe, they are so universal throughout the warm temperate and tropical zones, that they are as likely to have been originally introduced *into* Europe, as *from* it. Such are *Cynodon Dactylon*, *Senebiera didyma*, *Oxalis corniculata*, and *Gnaphalium luteo-album*.

The botany of Teneriffe has been so fully and so well illustrated, first by Von Buch and since by Webb and Berthelot, that it would be superfluous to attempt any general review of it; I will accordingly content myself with offering a few detached observations

It has been remarked*, that the neighbourhood of Santa Cruz in Teneriffe is one of the most barren localities of the whole Canary group. It is so in appearance, and perhaps actually is so in an agricultural view. To a botanist, however, Santa Cruz is very far from being a barren or uninteresting station. Even the appearance of the coast, as seen from the water at the season of my visit, was far less barren than I had expected from descriptions to find it. The coast mountains, though excessively rugged, abrupt and wild, are (at least in the early spring) far from being destitute of verdure; and beautifully green and fertile spots are discerned in the deep narrow valleys between them. A very singular appearance is given to the littoral mountains by the round pale green bushes or clumps of *Euphorbia Canariensis*, which are dotted over them in such a way as to produce a curiously spotty effect, that strikes the eye at a considerable distance.

The immediate neighbourhood of Santa Cruz is much more productive in a botanical view than that of Funchal. In the very outskirts of the town, as for instance around the Lazaretto, one finds some of the endemic Canarian species, such as *Aizoon Canariense*, *Notoceras Canariensis*, mingled with a great number of South-European plants, such as *Lamarckia aurea*, *Polycarpon tetraphyllum*, *Picridium Tingitanum*, *Erodium malacoides*, *Medicago*

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* London Journal of Botany, vol. vi. p. 137.

orbicularis and *minima*, *Plantago Lagopus*, *Bromus Madritensis*, and many more.

The rugged cliffs eastward of the town, and the mouths of the little valleys that intersect them, afford an abundance of curious and interesting plants. One is struck at first sight with the peculiarity of the flora; one sees at once that it is far more exotic than that of Madeira, and has much less in common with Europe, whether in its general physiognomy or its specific details. The uncouth *Euphorbia Canariensis**, one of the most abundant plants on the sea-cliffs and on all the rocky and rugged parts of the coast, up to the tops of the hills commanding Santa Cruz, immediately reminds us of the South-African flora; it has indeed a very close resemblance to the numerous succulent and prickly Euphorbias which form a material part of the extraordinary vegetation of Caffraria.

The singular and graceful *Plocama pendula*, another of the most abundant and characteristic plants of the coast near Santa Cruz, is, on the contrary, a thoroughly peculiar Canarian type, not connected with any other flora. The two other plants which especially characterize this part of the coast, and which, together with the two just mentioned†, give to it its distinctive botanical physiognomy, are the *Kleinia neriifolia* and *Euphorbia piscatoria*; the latter resembling, on a greater scale, the *Euphorbia dendroides* of the Mediterranean, while the *Kleinia*, which has the look of a Dragon-tree in miniature, is a truly African type. When, as often happens, the *Plocama* and the *Kleinia* grow in close contact with the clumps of *Euphorbia Canariensis*, the effect is singular; the light weeping form and lively green colour of the *Plocama* being strongly contrasted with the grey hue and gouty branches of the *Kleinia*, and with the stiff columns of the *Euphorbia*.

Other plants, which, by their abundance, particularly characterize this part of the coast, are *Artemisia argentea*‡, *Chrysanthemum fœniculaceum*, and the beautiful *Lavandula abrotanoides*. *Fagonia Cretica* also grows along the edges of the cliffs, as well as *Aizoon Canariense*, *Plantago amplexicaulis*, *Lotus sessilifolius*, *Portulaca oleracea*, and a pretty little *Cyperus*, which one is surprised to see flourishing on such arid rocks.

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* This plant is admirably well described by Von Buch.

† The physiognomy of these four plants is extremely well represented in the plates to Webb and Berthelot's great work.

‡ The people call it *Incienso*, and consider it an excellent remedy for colds and headaches.

The deep valleys which open on the coast north-eastward of Santa Cruz are full of interest to the botanist as well as the geologist. The picturesque Val Bufadera, rich in beautiful orange gardens, is one of the best examples. In the lower part of it, the shingle of the dry torrent bed, which occupies the flat bottom, is overspread with a thick growth of *Plocama pendula*, *Artemisia argentea*, *Euphorbia piscatoria*, *Lavandula abrotanoides*, mixed with some herbaceous Composites and Leguminous plants. The steep rocky hills on either side are dotted over with bushes of the *Euphorbia Canariensis* and *piscatoria*, the *Kleinia* and *Plocama*; and the *Opuntia*, an introduced plant, spreads in many places up the hill sides, and mingles with the native growth. Higher up, where the valley narrows, and a clear and rapid stream flows along the bottom, the native vegetation is very rich and interesting. The rocks, carpeted with *Selaginella denticulata*, are ornamented with a variety of fine plants, among which *Echium giganteum* and *strictum*, *Cineraria Tussilaginis*, *Andryala pinnatifida*, and various shrubby *Cichoraceæ*, *Lavandula pinnata*, *Messerschmidtia fruticosa*, *Rubia fruticosa*, *Hypericum Canariense*, *Jasminum humile*, *Globularia longifolia*, *Ranunculus cortusæfolius* var. (*R. Teneriffæ*, Pers.), and various Sempervivums, are conspicuous. *Periploca lævigata* forms beautiful wreaths amidst the thickets. Several Ferns also grow on the rocks in this valley; in particular, *Notholæna Marantæ*, *Ceterach aureum* (which appears to me a variety of *C. officinarum*), *Gymnogramme leptophylla*, *Adiantum Capillus*, *Davallia Canariensis*, and *Polypodium vulgare*. Baron Humboldt was certainly misinformed when he restricted the list of Ferns found in the region of the Vine in Teneriffe, to two Acrostichums (*Notholænæ*) and an Ophioglossum. The six that I have enumerated all grow within the region of Euphorbias*, and much below its upper limit.

Besides the endemic Canarian or *Macaronesian* species above noticed, a great many South-European plants grow along the bottoms of these valleys, especially near their mouths, such as *Asphodelus ramosus*, *Echium violaceum*, *Trifolium glomeratum*, *tomentosum* and *stellatum*, *Silene Gallica*, *Dianthus prolifer*, *Linum angustifolium*, *Plantago Psyllium* and *P. Lagopus*, *Briza maxima* and *minor*. *Achyranthes argentea*, a frequent plant in the valleys of this part of Teneriffe, is perhaps of African origin.

The beautiful neighbourhood of Orotava, on the north-west coast, has quite a different botanical character from that of Santa

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* The "Subtropical or African Region" of Von Buch.

Cruz. As the climate is less dry, and more temperate, so the vegetation, even in the lower region, has less of an African aspect, and reminds us rather more of Madeira and of Southern Europe. Some of the characteristic plants, which stamp the flora of the south-eastern coast with its most marked peculiarities, are either wanting or rare about Orotava. The *Kleinia* and the *Euphorbia piscatoria*, indeed, are abundant, but the *Euphorbia Canariensis* occurs only in a few places on the sea-cliffs *, and the *Plocama* I saw nowhere but near Icod de los Viños. Some of the most characteristic plants of the coast near Orotava are, the beautiful little *Frankenia ericifolia*, *Statice pectinata*, *Paronychia Canariensis*, *Crithmum maritimum*, *Lotus sessilifolius*, *Artemisia argentea*, and a glaucous-leaved *Pyrethrum*. *Argemone Mexicana*, a wanderer from the tropics (within which it appears to be very widely diffused), grows on the sea-shore at the mouth of the Barranco Ruiz, near S. Juan de la Rambla, and more abundantly at Garachico.

The great abundance of Date Palms in the valley of Orotava and some of the other valleys of that coast, forms a striking feature in the landscape, and distinguishes it particularly from the scenery of Madeira, where there are comparatively very few of these trees. The *Phœnix*, however, does not appear to be indigenous to Teneriffe, as it is to the islands of Canaria and Palma. The *Dracæna* is a scarcely less conspicuous feature in the scenery of Orotava, but although it is ascertained to be indigenous to the island of Teneriffe, almost all the trees which occur in this valley are evidently cultivated.

The famous Dragon-tree of Villa de Orotava, so well known through Humboldt's description, is still in existence ; a ruin indeed, but a noble ruin. Its foliage is still fresh and vigorous, but the tree has been much shattered, and has lost many branches within the last few years, and a gentleman who has long known it is of opinion that it will not last another century. By my measurement, the part that remains entire of the trunk is 30 feet round, that is, from edge to edge of the hollow ; and the width across the hollow is 12 feet. This measurement was taken at 8½ feet above the roots. I measured another Dragon-tree, a flourishing and comparatively young one, which stands beside a convent at Realejo de Arriba, and found the circumference of the trunk to be 14 feet 4 inches, at 4 feet from the ground. There is a still finer one at Icod de los Viños.

The remarkable ravines, or *Barrancos*, which are most characteristic features of the physical geography of Teneriffe, are rich in curious plants. In their lower parts (below 1000 feet or thereabouts), one of their peculiarly characteristic plants is the *Rumex Lunaria*, a fine shrub with broad glossy bright green leaves and ample spreading panicles; certainly the handsomest of its genus. The *Ricinus communis* (Palma-Christi) is frequent and ornamental, and whether originally introduced or not, has all the appearance of a wild plant. A fine large, shrubby, prickly Solanum, with showy purple flowers (*S. Vespertilio*), has quite a tropical aspect, strongly reminding one of some of the Brazilian Solanums; while on the other hand, the *Aloë vulgaris*, which is seen here and there in some of the barrancos near Orotava, is a South-African form; and the shrubby *Sonchi* are peculiarly Canarian. Some conspicuous plants of the forest region straggle far down these ravines to an elevation of only a few hundred feet; as is the case with the beautiful *Escobon* (*Cytisus proliferus*), and the *Erica arborea*, in the Barranco de S. Felipe near Orotava.

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* Particularly near La Paz, a little way to the east of the Puerto de Orotava.

About the level of Villa de Orotava (1000 feet), or a little below it, the Ferns begin to be very abundant and beautiful, and, in company with Houseleeks, profusely adorn the rocky banks and stone walls. *Polypodium vulgare* * and *Davallia Canariensis* are, here as in Madeira, the most abundant kinds; *Gymnogramme leptophylla*, *Notholæna Marantæ*, *Asplenium palmatum*, and *Nephrodium elongatum*, frequent and fine. Some of these occur here and there at a much lower level; and near Garachico the *Asplenium palmatum* descends even to the sea-shore. *Pteris longifolia* is rare; I saw it only in one spot, on the margin of a rivulet that crosses the road between Garachico and Icod de los Viños. *Cheilanthes pulchella* grows in rather arid rocky spots, among the *Cistus Monspeliensis*, in the wild rugged country (overspread with obsidian) between Icod de los Viños and the village of La Guancha.

Towards the level of Villa de Orotava, too, one begins to meet with the *Hypericum grandifolium*, and the beautiful crimson Cineraria (*C. Tussilaginis* †), which is one of the greatest ornaments of the lower part of the woody zone.

Although there has been a lamentable waste of the beautiful forests of Teneriffe, yet there are still some accessible spots where the woodland vegetation may be seen in all its luxuriance. Such is the wood of Agua Mansa, above Orotava, which is fortunately preserved unhurt, through a belief (doubtless well-founded) that the destruction of the shade would lead to the failure or diminution of the fine spring which supplies the town and valley with water. The elevation of Agua Mansa is rather more than 4000 feet * above the sea-level.

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* It is very singular that Von Buch should have entirely omitted this *Polypodium* in his lists of Canarian plants.

† *Senecio Tussilaginis*, DC.

The large trees in the wood are principally Viñaticos, *Persea Indica*, and some of them are indeed of great size and noble aspect. Beneath them is a luxuriant and beautiful undergrowth of *Erica arborea*, *Myrica Faya*, *Viburnum rugosum*, *Ilex Canariensis*, Webb and Berth. (the *Aceviño* of the Canarians), *Hypericum grandifolium*, and one or two species of *Cistus*. Few herbaceous plants were in flower at the season of my visit, except a beautiful Forget-me-not, considered by Webb and Berthelot as identical with our *Myosotis sylvatica*. Ferns are abundant and fine, particularly *Pteris arguta*, *Asplenium acutum*, and *Cystopteris fragilis*. *Gymnogramme leptophylla* ascends to this elevation. The ground, the rocks, and the trunks of trees, are richly carpeted with Mosses: of these the most remarkable is the *Glyphocarpus Webbii* †, Mont., which is in great abundance, covering the moist rocks with broad cushion-like patches of a rich yellow hue; this seems to have been hitherto found nowhere else. With this exception, the hypnoid mosses predominate greatly; but the variety of species did not appear to be in proportion to the extent of surface they covered. *Pterogonium gracile* and *Hypnum cupressiforme* are especially abundant, covering the trunks of the trees; the latter of them, as with us, sporting into many varieties. Other Mosses which I found here were:—

Hypnum Illecebrum (*H. blandum*, Lyell): abundant, but I could find no fruit; the leaves, however, agree with those of authentic specimens from the late Mr. Lyell.

H. alopecurum? (var. with compressed branches and bifarious leaves): on very wet rocks; barren.

Leskea sericea.

Neckera pennata?: on trees, sparingly and barren.

Neckera (*Antitrichia*, Brid.) *curtipendula*: on rocks, not in fructification.

Leucodon sciuroides.

Leptodon Smithii, Brid. (*Pterogonium*, Sm.): on trees.

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* 3820 French feet, according to Von Buch.

† Montagne, in Webb and Berthelot, Hist. Nat. Canar., Cryptog. p. 28. pl. 2. fig. 2.

Leptodon longisetus, Mont.: in abundance on some large old trees, but producing fructification very sparingly.

Schistidium ciliatum, Brid.: on rocks.

On the mountain side near the wood of Agua Mansa, but separately, not intermixed with the other trees, grow a number of fine pines, *Pinus Canariensis*: this is the nearest spot to Orotava, and the most accessible, in which they are to be seen in a state of nature. This species of Pine is a noble and picturesque tree, perhaps the finest that I have seen of its genus. The representations of it in the Atlas to Webb and Berthelot's work do not give a good idea of its appearance, at least as I have seen it; it has not the stiff and formal regularity there represented, but rather the free and bold style of branching of the finest states of *Pinus sylvestris*; while the very long, slender, drooping and almost pendulous leaves give it a distinct and peculiar character.

The prevalence of the *Erica arborea* is one of the most striking characteristics of the forest zone in this part of Teneriffe. This beautiful shrub or tree forms a broad and continuous belt along the face of the great screen of mountains which half encloses the valley of Orotava. Whether one ascends towards the Peak by the usual route, or along the Tigayga ridge, in either case, after passing the limits of cultivation, one proceeds for hours through a dense and uninterrupted shrubbery of this Heath. The larger trees having been destroyed, the *Erica* now predominates over everything else. The *Myrica Faya* (*Faya fragifera*, Webb), the *Aceviño* (*Ilex Canariensis*), the *Pteris aquilina*, and one or two *Cisti*, grow intermixed with it, but in smaller quantity. A similar and most luxuriant shrubbery of *Erica arborea* and *Myrica Faya* is crossed before arriving at the wood of Agua Mansa. The Heath here grows ten or twelve feet high, and the effect of its countless myriads of white bells is quite charming. The lower limit of this great zone of *Erica* is probably not much below 3000 feet, but whether it would not extend lower if not interfered with by cultivation, may be doubtful. In the deep *barrancos*, as I have already remarked, the *Erica* flourishes in a scattered manner down to a much lower level.

The *Erica scoparia*, which in Madeira generally accompanies the *arborea*, appears to be scarce or local in Teneriffe. In the Azores, on the other hand, the *scoparia* prevails to the exclusion of the *arborea* *. The prodigious abundance of these Heaths in Madeira and the Canaries, while the species are so few, is very remarkable.

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* Watson, in Hook. Lond. Journal of Botany.

It exemplifies in a striking manner the two different ways in which the botany of a country may be looked at. If we consider only the number of species, the *Ericaceæ* form but an insignificant part of the vegetation of the islands in question; and so a botanist judging from dried collections would consider them; whereas, from the extraordinary multiplication of one or two species, they form, in another point of view, a most important element in the vegetation.

The well-marked succession of different zones of vegetation, as one ascends from Orotava towards the Peak, is very interesting, although its effect must have been more striking before the destruction of the great trees. Starting from amidst the gardens of the coast, where the Banana, the Date Palm, the Orange, and the Coffee flourish in luxuriant beauty, we ascend for more than 2000 feet through cultivated grounds, the aspect of which becomes progressively more and more like that of Middle Europe. One can hardly define the limit between the zone of tropical, and that of European culture; the one seems to melt gradually into the other. Wheat is grown from the coast up to the beginning of the Heath zone, but the difference of climate is well shown by its state of forwardness; at the time of my visit it was in full ear, and approaching to ripeness in the valley, whereas at the upper limit of its zone it was only peeping above the ground. At this higher level, Lupins are the principal crop. The commencement of the woody zone is marked by the Tree Heath clothing all the waste and stony ground between the fields. Presently we come to the very extensive zone of shrubbery composed of this Heath (*Erica arborea*), together with the *Myrica Faya*, *Ilex Canariensis*, and *Hypericum grandifolium*. This shrubbery here seems to represent *both* the woody zones,—that of the Laurels and that of the Pine; for on this part of the mountain range the woods have been all cut down, and a solitary Pine, high up in the savage ravine on the left of our path, is the only tree to be seen in the whole ascent after we have left the cultivated fruit-trees. The case is nearly the same in ascending by the other route, from the Tigayga and Icod el Alto; only here, there still remain a few large Viñaticos around the fine spring called Fuente de Pedro.

To the region of the Heath succeeds, as we ascend, that of the *Codeso del Pico*, *Adenocarpus frankenioides*, DC. The limit of this is particularly well-marked. For a little space it is intermixed with scattered and stunted bushes of the Heath, but this soon thins out and disappears, and for miles the whole slope is covered with the *Adenocarpus* alone, as some of our commons and wastes in England are covered with Furze. It is in general a low compact rigid bush, peculiar in its multitude of short lateral branches and the minute closely-crowded grey-green leaves; by no means a handsome plant when out of flower; but here and there, in sheltered spots, it assumes the character of a little tree. It is very surprising to me, that Von Humboldt, in his famous description of the Peak, should have omitted all mention of this plant, which occupies by itself so wide a tract of ground. It is one of the most eminently *social* plants in the world.

The first bushes of the *Retama blanca*, *Cytisus nubigenus* (*Spartium nubigenum*, Soland.), appear immediately below the *Cumbre*, or ridge surrounding the actual Peak. Here the *Adenocarpus* is thinly scattered amidst the wilderness of loose stones and rugged rocks; and when the ridge is surmounted, and we enter the great *plateau* of pumice-stone (*Las Cañadas*), no vegetation is to be seen except the *Retama*, forming large isolated bushes at considerable distances apart. These bushes are of a very regular hemispherical form. I was assured by a most intelligent observer, that the fragrance of the flowers of this plant is so powerful, that in the early morning it may sometimes be distinctly perceived at the Port of Orotava.

To a botanist acquainted with the Alps, there is something very striking in the entire absence, from the upper regions of Teneriffe, of all those forms which we are accustomed to consider as *alpine*. In place of the fine close carpet of small grasses, and dwarf herbaceous plants with brilliant flowers, which clothes the heights above the region of trees on the European mountains, we see here a very few species of rigid shrubs, monopolizing vast spaces. For although, according to the observations of Von Buch, and of Webb and Berthelot, the region of the *Cumbre* is not entirely destitute of herbaceous plants, yet they are rare, and occur only as single individuals, thinly scattered. Nowhere is there anything like a turf. Even mosses occur only in small scattered tufts on the larger rocks. The peculiar aridity and unstable character of the soil are evidently the causes of this. The mountain vegetation most analogous to that of the Peak of Teneriffe is (as Webb and Berthelot have shown) that of Etna. The upper region of Pico, in the Azores, seems very different in its botanical physiognomy *, being characterized by *Calluna vulgaris*, *Erica scoparia*, *Vaccinium Maderense*, a *Myrsine*, and a Juniper; while it is entirely wanting in the shrubby *Leguminosæ*, which form the whole of the ligneous vegetation of the highest parts of Teneriffe.

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* Watson, in Hooker's London Journ. Bot. ii. 401–405.

In the prevalence of Leguminous shrubs, the Teneriffe flora shows an analogy to that of Spain. Besides the two already mentioned, which are confined to heights above the region of the Heath, several other *Genisteæ* abound at lesser elevations, especially the beautiful *Adenocarpus foliolosus* and *Cytisus proliferus*. Another point of resemblance between the Teneriffe flora and that of Spain, is the abundance, in some parts of the island, of various species of *Cistus*. The *Cistus Monspeliensis*, in particular, is the prevailing shrub of the wild, rugged, rocky country between Icod de los Viños and Icod el Alto; and the curious *Cytinus Hypocistis* grows plentifully on its roots, as in the south of Europe. These analogies between the vegetation of the Canaries and that of the Iberian Peninsula are the more remarkable, as they seem to be wanting in Madeira.

The beautiful wood of Agua Garcia, of which a glowing (but not exaggerated) description is given by Webb and Berthelot, is the finest example I saw of the forest vegetation of Teneriffe. It is especially remarkable for the profusion of Ferns and Mosses, and for the gigantic growth of *Erica arborea*. Towards the outskirts of the forest, in particular, this Heath grows to a surprising size, even to the height of 40 feet; it is however always slender in proportion, and none of the trunks that I measured were more than four feet round. The forest consists entirely of evergreen trees: the most abundant, as far as I saw, appeared to be the *Laurus* (*Persea*) *Indica* (Viñatico), *Laurus Canariensis*, *Ilex platyphylla*, Webb and Berth., *Myrica Faya*, and *Viburnum rugosum*,—for this last grows here quite to the size of a tree. The variety of species, however, is greater than I was able, in one hasty visit, to ascertain: M. Berthelot told me that he had found in that wood not less than 25 species of trees; but all are evergreen, and all (with the exception of the Heath) have a great general resemblance of physiognomy. All (with the aforesaid exception) belong to the Laurel form or type of vegetation, having broad, undivided, deep green, shining leaves, more or less coriaceous, and approaching to an elliptical or lanceolate form, in no degree lobed or cut. This prevalence of one particular type of foliage distinguishes in a marked manner the forest vegetation of Teneriffe from that of the tropics; as, on the other hand, its evergreen character contrasts with the woods of Europe. In tropical forests, indeed, there is a great abundance of trees of the Laurel type,—*Laurineæ*, *Gutti-*

feræ, Figs, and others; but they are always mixed with various other well-marked forms, particularly with that beautiful form of the *Mimoseæ*, which is entirely absent from the Canaries.

Of herbaceous flowering plants, in the wood of Agua Garcia, one of the most ornamental and interesting is the *Geranium anemonefolium*. The profuse abundance and luxuriant growth of the Ferns are very striking. The *Woodwardia radicans* and *Polystichum aculeatum* grow to extraordinary size and beauty; and the *Trichomanes speciosum* mantles the wet overhanging banks with its dark green glistening fronds.

The most abundant moss, by far, is *Hypnum cupressiforme*, which, in many varieties, entirely clothes the trunks of the largest trees.

Of the other mosses that I observed in my hasty visit to this locality, the most interesting was *Fissidens serrulatus*, Brid., growing in profusion on the wet rocks and banks, often in company with the *Trichomanes speciosum*, and bearing abundant fructification.

To sum up my observations on Teneriffe, I may say, that the botanical features most striking to me were:—1. In the coast region, the remarkable forms of the *Euphorbia Canariensis*, *E. piscatoria*, *Kleinia neriifolia*, and *Plocama pendula*; the social growth of the *Artemisia argentea*, covering great spaces of rocky and stony ground with its whitish foliage; the conspicuous abundance (especially on the Orotava side of the island) of cultivated Date Palms and Dragon-trees; and, in the ravines, the striking and peculiar forms of shrubby species of *Rumex*, *Echium*, *Solanum*, and *Sonchus*. 2. In the woody region, the prevalence of trees of the Laurel type of foliage; the vast extent of ground occupied by the *Erica arborea*, and the surprising size to which it grows in favourable localities; the abundance of Ferns and Hypnoid Mosses in the more damp and shaded situations, and of *Cistineæ* and *Genisteæ* on the dry and open grounds; and the noble form of the Canary Pine in the upper part of this zone. 3. The great zone occupied by the *Adenocarpus frankenioides* above the region of trees, and that of the *Cytisus nubigenus* at a still higher level.

The striking botanical features of Madeira may be summed up thus:—1. The tropical cultivation in the lower region, contrasted with the South-European or Mediterranean character of the native vegetation. 2. The frequency, in that same region, of plants evidently or probably introduced, and belonging to very different countries. 3. The abundance and variety of Ferns, more particularly indeed in the forest region, but also in the ravines at lower levels, and even down to the coast on the northern side. 4. The great abundance of two large and conspicuous species of *Sempervivum*, especially in the ravines of the north side. 5. The forests of Laurel-like trees; and 6. The prevalence of *Vaccinium padifolium*, *Erica arborea* and *E. scoparia*, not only as undergrowth in the forests, but almost entirely covering the upper mountain-region.

The most remarkable *negative* characteristics of Madeira botany, as compared with that of Teneriffe, are, the absence of most of the peculiar and striking forms belonging to the coast-region of the latter country, especially of the succulent *Euphorbia*, the *Kleinia*, and the *Plocama*; the absence of Pines and *Cisti*; and the small number of shrubby *Leguminosæ*.

On some New Species of *Chamælaucieæ*. By Dr. C. F. MEISNER.

[Read November 20th, 1855.]

AMONG those natural orders or tribes of plants which are particularly characteristic or exclusively peculiar to the Flora of New Holland, the Myrtaceous group established by DeCandolle under the name *Chamælaucieæ* is one of the more remarkable, as well for the numerous and curious modifications of structure it presents, as also for the uncommon elegance and loveliness of its flowers. In the latter respect it is surprising, indeed, that although several of the finest species are not uncommon in the Swan River colony, and long since well-known to botanists, especially through the collections made and distributed by Drummond and Preiss, these charming shrubs have not yet found their way to our greenhouses, where they would certainly be admired as a most valuable and highly ornamental acquisition. Whether it be that the seeds of these mono- or oligospermous shrubs are perhaps scarce or difficult to procure, or that the transport of living individuals and their culture offer peculiar difficulties (which however can hardly be supposed, considering their close affinity of structure and similarity of growth with the other New Holland Myrtaceæ, of which so many are common and perfectly thriving in our greenhouses), or whatever reason there be, I must leave undecided; but the fact is, that, as far as I have been able to ascertain, the only representatives of *Chamælaucieæ* introduced until the last year into European gardens were two or three species of *Calycothrix*, to which have been quite recently added two fine species of *Genetyllis*, published with beautiful figures in the 'Botanical Magazine' for July, plates 4858 and 4860. On comparing these plates with the specimens in Mr. Drummond's last (6th) collection, I have been led to examine also the whole of the *Chamælaucieæ* it contains, and have found almost all of them to be new species, the characters of which form the subject of this paper. It will show at the same time that in the beautiful genus *Verticordia* certain details of structure appear to have remained unnoticed till now, while others have been explained in a wrong or at least unsatisfactory manner, and that both these circumstances will render necessary certain alterations in the character and subdivision of the genus. To conclude these introductory lines with a survey of the progress our acquaintance with *Chamælaucieæ* has made during the last twenty-seven years, we find that in 1828 (DeC. Prodr. vol. iii.) there were only ten species known, distributed in five genera. To these were added by Dr. Schauer, in his 'Monograph' (1841) and in the 'Plantæ Preissianæ' (1844) six new genera, including sixty-two species, mostly discovered by Baron von Hügel, Drummond and Preiss, and partly previously published by Endlicher and Prof. Lindley. Another addition of twenty-six new species from Drummond's collections was published in 1849 by Turczaninow in the 'Bulletin de la Soc. Imp. d'Hist. Nat. de Moscou,' .tomes xx. and xxii. (1847–49), and of one *Genetyllis* by Lindley in Mitchell's Exped. ii. p. 178 (which Dr. Müller refers to his *Lhotskya genetylloides* in the Transact. Philos. Soc. of Victoria, no. 1. p. 16), so that, with the following twenty-two new species, the total number of *Chamælaucieæ* described up to this day amounts to 121 species, comprised in eleven genera.

1. GENETYLLIS (*Involucratæ*) SPECIOSA, *nob.* (non *Turcz.*), glaberrima, foliis oppositis sessilibus imbricatis internodia æquantibus v. superantibus oblongis obtusis integerrimis supra concavis, involucro ovato-oblongo pollicari 3–5-floro, bracteis interioribus conniventibus sanguineis ovato-oblongis apice attenuatis, floribus sessilibus 2-bracteolatis, calycis tubo turbinato 5-costato, lobis 5 oblongis acutiusculis dimidium tubi corollæque subæquantibus, staminodiis lineari-oblongis stamina æquantibus, stylo incluso supernè barbato.

Hab. "Plentiful on the sand-plains to the east and west of the Hill River." *Drummond*, coll. 6. n. 34!; *Hook. Journ.* 1853, p. 118.

Although agreeing in many points with the plant figured in Bot. Mag. t. 4860, which is considered as *G. macrostegia*, Turcz., our plant sufficiently differs from it to justify its being established as a distinct and new species. Its leaves are much smaller, only 2–3 lines long, 1–$\frac{5}{4}$ line broad, everywhere opposite (not alternating, as the figure shows them, especially on the upper part of the branches), more crowded and adpressed, less flat, and there is no trace of a serrulate margin; the inner bracts of the involucre are tapering towards their end, not rounded or emarginate; and the lobes of the calyx, which in the figure appear quite short and semicircular, are narrower and more than twice as long. Moreover, Drummond's plant (if we are correct in referring his notice in Hook. Journ. 1853, p. 118, to no. 34 of the collection) seems to differ also in habit, being only about 1 foot high, with numerous short, erect, flowerless shoots, densely crowded in the centre, around which the flowering branches are prostrate and bearing *erect* flower-heads, whereas the plant figured t. 4860 appears to be a taller shrub and shows *hanging* capitula, a difference hardly attributable to the mere effect of cultivation. Turczaninow's description of his *G. macrostegia* differs from our plant partly in the same points as that of the Bot. Mag. t. 4860, and moreover in having the tube of the calyx carved with ten ribs at the lower and twenty at the upper part, a character in which it equally disagrees with the latter, which therefore I suspect to be a distinct species, for which I would propose the name of *G. Hookeriana*. Drummond's n. 34 comes also very near *G. œderioides*, Turcz., which however is easily distinguished by subtriquetrous leaves, ciliated bracts, &c.

2. G. (*Involucratæ*) HELICHRYSOIDES, *nob.*, glaberrima, foliis oppositis patulis acerosis carinato-triquetris apice truncato-bicuspidulatis marginibus (sub lente) ciliolato-serrulatis, capitulis nutantibus 4-floris, involucro ovato-oblongo subclauso, bracteis interioribus sanguineis v. roseis ovato-oblongis haud ciliatis apice virescenti subcarinato obtusiusculè acuminatis, exterioribus brevioribus semiherbaceis, bracteolis flores sessiles subæquantibus, calyce campanulato lævissimo, lobis tubo dimidio brevioribus rotundatis integerrimis, staminodiis subulatis glanduloso-subcapitatis stamina æquantibus, stylo apice barbellato.

Hab. cum præcedente. *Drummond*, coll. 6. n. 35!

Probably the plant alluded to by Drummond in the 'Journal of Botany,' 1853, p. 118, in these words:—"Another pretty species of this genus grows about a foot high, with heath-like leaves; the drooping heads of the flowers are surrounded by glabrous bracts of a deep rose-colour." It is very near *G. speciosa* and *œderioides*, but differs from the former in the triquetrous, thinner and ciliolate leaves, from the latter in having the bracts not ciliated, and from both in the tube of the calyx being without any trace of ribs or furrows.

3. G. (*Bracteatæ*) SANGUINEA, *nob.*, humilis decumbens glaberrima, foliis oppositis patulis lanceolatis acutiusculis margine subrecurvo minutè ciliolato-serrulatis subtùs subcarinato-uninerviis, capitulo terminali brevissimè pedunculato hemisphærico cernuo composito, partialibus 3–5 obovato-globosis densè congestis 2–4-floris subsessilibus, bracteis membranaceis sanguineis adpressis, primariis lanceolatis subcarinatis, secundariis brevioribus latioribusque subrotundis brevè acuminatis florem amplectentibus et subæquantibus, calyce obconico infernè 5-costato inter costas papilloso, lobis 5 erectis ovatis acuminatis dimidium tubum petalaque æquantibus, staminodiis subulatis stamina æquantibus, stylo exserto compresso glabro apice obtuso barbellato.

Hab. cum præcedente. *Drummond*, coll. 6. n. 36!

Caules spithamæi v. vix pedales, apice adscendentes, secundè ramulosi, cicatricibus parvulis tuberculosi. Folia 2–4 lin. longa, ½–ferè 1 lin. lata, subtùs glandulis fuscis punctata, juniora subimbricata. Pedunculus communis 2–3 lin. longus. Capitulum magnit. cerasi majoris, bracteis primariis 3 lin. longis basi 1 lin. latis, secundariis petaloideis roseis diaphanis. Calyx ferè 3 lin. longus, obsoletè 10-nervius, fauce leviter constrictâ, lobis petalisque ovatis integerrimis stylo dimidio superatis.

Approaching *G.* (*Polyzonæ*) *purpurea*, Endl., which however differs in the leaves and inflorescence, and especially in the annulate calyx.

4. G. (*Bracteatæ*) VIRESCENS, *nob.*, humilis glaberrima, foliis patulis triquetro-linearibus obtusiusculis lævibus, capitulo terminali subsessili sphæroideo cernuo simplici multifloro, bracteis subherbaceis ovato-lanceolatis enerviis demum patulis, bracteolis flore dimidio brevioribus, calyce subcampanulato ecostato, lobis 5 brevissimis erectis petalisque ovato-oblongis obtusis, staminodiis subulatis stamina æquantibus, stylo longè exserto crassiusculo compresso apice tenui barbellato.

Hab. cum præcedente. *Drummond*, coll. 6. n. 37!

Although very similar to *G. sanguinea*, this is easily distinguished from it by the smooth and triquetrous leaves and the inflorescence. The receptacle is convex, about 6 lines in diameter and somewhat crenate on the margin, thus showing a tendency to divide into several short peduncles, and to form a compound capitule, as in the preceding species. The bracteæ are of a greenish colour, 5–6 lines long and 2–3 lines broad at the base. The style is half an inch long.

5. VERTICORDIA STELLULIGERA, *nob.*, glabra, foliis triquetro-linearibus obtusissimis, corymbis terminalibus divaricato-trifidis, floribus subcapitato-

racemosis (parvis citrinis), pedicellis folio brevioribus, bracteolis caducis, calycis tubo sphæroideo ecostato infernè patenti-piloso, limbo uniseriali 5-partito, lobis subunguiculatis palmatim 3–5-partitis, lacinulis longiusculè pinnatim fimbriatis mollibus, petalis subrotundis brevè fimbriato-ciliatis glabriusculis, staminodiis subulatis acutis stamina æquantibus glanduloso-verruculosis, stylo brevè exserto infra stigma obtusum hispidulo.

Hab. cum præcedente. *Drummond*, coll. 6. n. 50!

Affinis *V. densifloræ* Lindl. (ad quam referenda videtur planta Drummondii coll. 6. n. 49) et *V. fimbripetalæ* Turcz., sed a posteriore distincta calyce ecostato, loborum lacinulis non aristatis, stylo apice tantum pubescente, stigmate simplici nec capitato, etc.; a priore floribus luteis (nec roseis), staminibus corolla dimidio brevioribus (nec æqualibus), etc. Folia 2–3 lin. longa, ½–⅔ lin. lata demum patula, novella pseudo-fasciculata. Capitula 4–8-flora. Calycis limbus patens, diametro vix 3 lin., lobis pallide citrinis stellulam referentibus, fimbriis radiantibus vix 1 lin. longis. Antheræ subglobosæ, muticæ.

6. VERTICORDIA NOBILIS, *nob.*, glabra, foliis triquetro-linearibus obtusis submucronulatis, corymbis terminalibus simplicibus brevibus, bracteolis 2 connatis diù persistentibus, calyce majusculo, tubo turbinato glaberrimo infernè 10-costato, limbo petaloideo aureo 1-seriali 5-fido, lobis subrotundis sessilibus palmatim multifidis, lacinulis rectis linearibus planis pinnato-ciliatis, petalis ovatis longe fimbriato-ciliatis, staminodiis lanceolatis utrinque 1–2-dentatis filamentis fertilibus subulatis nudis brevè superatis, antheris pendulis ovalibus inflexo-bicornutis, stylo tenui stigmateque imberbi.

Hab. in planitie prope Smith River. *Drum. in Hook. Journ.* 1853, p. 120. coll. 6. n. 47!

A beautiful species, closely approaching *V. grandiflora*, Endl. (*V. heliantha*, Lindl.), but differing in its higher growth, larger leaves and flowers, and in the shape of the sterile filaments, which are subulate, not cuneato-trifid. The anthers are exactly as figured in *V. grandiflora* by Schauer, Monogr. t. 4. B. f. 7. Leaves 3–4 lines long, ½–1 line broad, with a very minute mucro, the younger ones imbricate. Peduncles 1-flowered, about an inch long, compressed. Bracteoles at last half separating, cut off from the peduncle, and falling off as a bifid calyptra. Expanded calyx 7 lines in diameter, without a trace of outer appendages.

7. VERTICORDIA CALLITRICHA, *nob.*, glabra, foliis linearibus compresso-triquetris obtusis minutè mucronulatis basi attenuatis marginibus carinâque integerrimis acutis, faciebus planis, superiore lateralibus dimidio angustiore, corymbis terminalibus simplicibus 6–8-floris densis, pedicellis folia parùm superantibus, bracteolis caducis, calycis tubo campanulato-turbinato supra basin hemisphæricam densè villosulam glabro colorato 10-costato sursùm breviter dilatato, limbo biseriali, utriusque seriei lobis 5 capillaceo-multifidis roseis, lacinulis indivisis mollibus comam densam formantibus, lobis serie

exterioris a sinubus interioris deflexis subunguiculatis calycis tubum subæquantibus et abscondentibus, seriei interioris sessilibus patulis, petalis ovatis indivisis toto margine densè fimbriato-ciliatis, staminibus 10 styloque tenui glabro exsertis, filamentis capillaribus cum staminodiis conformibus dimidio brevioribus basi monadelphis, antheris ovalibus muticis, stigmate subcapitato.

Hab. cum præcedente. *Drumm.* coll. 6. n. 48!

Corymboso-ramulosa. Folia viridia, 4–7 lin. longa, faciebus lateralibus ½–¾ lin. latis. Pedicelli 6–8 lin. longi, teretes, deflorati apice truncato-patelliformes. Flores pallidè rosei v. ferè albi, expansi diam. 5 lin., calycis fimbriis 2–3 lin. longis haud nitentibus, petalorum ciliis mollibus calycem æquantibus. Genitalia florem superantia.

This pretty species agrees in the essential points of structure of the calyx with *V. insignis*, Endl. (Schauer, Monogr. t. 4. B. f. 10, 11), but differs from it in the shape and size of the leaves, in the exterior (reflexed) lobes of the calyx being neither connected with the base of the tube nor divided into recurved lobules, in the simple and filiform staminodia, &c. It has also some affinity with *V. compta* and *Hügelii*, Endl., and *V. Lehmanni*, Schauer, and consequently must belong to Schauer's section *Catocalypta*, the characters of which however, as given by the author, would scarcely be recognized in our plant without the assistance of the quoted figure.

8. VERTICORDIA OVALIFOLIA, *nob.*, glabra, ramis gracilibus apice corymboso-ramulosis, foliis imbricatis glaucis ovalibus suborbicularibusque obtusissimis integerrimis planis, racemis brevibus pedunculatis in corymbum congestis, pedicellis folio vix longioribus, bracteolis caducis, calycis tubo obconico glaberrimo basi tenui rugoso-striato, limbo biseriali, lobis 5 exterioribus deflexis dimidio tubo brevioribus albo-membranaceis ciliatis, interioribus 5 brevibus patulis subtruncatis palmatim inciso-multifidis, laciniis pinnatim 2–3-fidis, lacinulis setaceis densè brevèque plumoso-ciliatis pallidè roseis, petalis coriaceo-scariosis ovatis apice irregulariter inciso–3–5-fidis, laciniis setaceis rigidulis fimbriatis v. passim simplicibus, filamentis staminodiisque subæquilongis subulatis corollâ brevioribus, antheris ovatis apiculatis, stylo infra stigma obtusum hispidulo.

Hab. cum præcedente. *Drumm.* coll. 6. n. 45!

Rami longi simplices. Folia 2½–3 lin. longa et plerumque vix angustiora dorso leviter 1- passim basi 3-nervia, subeglandulosa, margine vix diaphano. Pedicelli crassiusculi, deflorati apice truncato brevissime bilobi. Calycis tubus 2 lin. longus, loborum exteriorum ciliis tubum subæquantibus, lobis interioribus 3 lin. longis nitidis. Petala basi lata sessilia infernè maculâ rubrâ ? notata, excepto apice integerrima. Staminodia glandulâ minutâ rubrâ capitata.

This species is very distinct from any other, and although approaching in habit and foliage *V. oculata*, and at first sight

almost like it in the flowers, it differs so materially in the structure of the flowers, that it cannot even take its place in the same section of the genus.

9. VERTICORDIA CHRYSOSTACHYS, *nob.*, glaberrima, ramis gracilibus, junioribus imbricato-foliosis, foliis glaucis? orbicularibus planis enerviis margine integerrimo haud diaphanis demùm patulis, racemis terminalibus spiciformibus foliosis densis apice sterilibus, pedunculis folium æquantibus, bracteolis 2 cucullatis apiculatis, calycis tubo glabro obconico 5-costato, limbo 3-seriali, seriei exterioris lobis 5 deflexis herbaceis semirotundis integerrimis tubo dimidio brevioribus ejusque valleculis semiadnatis, seriei secundæ lobis illis alternis deflexis tubum æquantibus totumque obvelantibus petaloideis luteis sessilibus cordato-subrotundis toto ambitu integro brevè ciliatis, seriei tertiæ (intimæ) lobis 5 illis alternis brevibus margine truncato subpalmatim 7-partitis, laciniis setaceis densè plumoso-ciliatis citrinis, petalis ovatis acutis indivisis toto margine longiusculè ciliatis, filamentis staminodiisque subæqualibus subulatis, antheris ovalibus muticis, stylo tenui glabro apice sigmoideo hinc densè barbellato.

Hab. cum præcedente. *Drumm.* coll. 6. n. 46!

Rami corymboso- v. fastigiato-ramulosi. Folia subcarnosa? 2–3 lin. longa, basi obtusa v. vix emarginata, dorso glandulis fuscis punctata. Racemi aurei, 1–2½ poll. longi, pedicellis apice brevissimè bilobis (2-bracteatis?). Alabastra magnit. pisi, obovato-subglobosa, bracteolis 2 enerviis membranaceis tecta, prope apicem 2-mucronulata, lutea v. hinc sanguinea. Calycis expansi diameter 5–6 lin.

A very elegant and quite distinct species, resembling the two following ones in the shape of the leaves and inflorescence, but very different in the smaller size of the leaves and flower, in the colour of the calyx, and the form of the lobes or appendages of the second series. From all the yellow-flowered species it is widely different in the leaves.

10. VERTICORDIA OCULATA, *nob.*, glaberrima, ramis gracilibus imbricato-foliosis, foliis glaucis orbicularibus planis basi emarginatis enerviis margine angustè albido-diaphanis, racemis terminalibus foliosis, pedunculis folio subduplò longioribus, bracteolis 2 cucullatis apiculatis, calycis tubo glabro obconico 5-costato, limbo 3-seriali, seriei exterioris lobis 5 deflexis herbaceis integerrimis tubo adpressis et parùm brevioribus, seriei secundæ lobis 5 paullò brevioribus deflexis patulisve scariosis nitidis subspathulatis longè fimbriato-ciliatis albis, seriei tertiæ lobis 5 brevibus latis (maculâ violaceâ reniformi notatis) inciso-serratis, dentibus 7–11 argenteis in aristam tenuem indivisam plumoso-ciliatam nitentem productis, petalis subrotundis fimbriato-multifidis, fimbriis setaceis indivisis eciliatis, filamentis staminodiisque æqualibus subulatis semimonadelphis, stylo complanato glabro, stigmate obtuso barbâ densâ crispâ cincto.

Hab. in planitie arenosâ inter flum. Hutt et Murchison, *Drummond in Hook. Journ.* 1853, p. 119. coll. 6. n. 43!

Frutex (fide *Drumm. l. c.*) 5–6-pedalis, gracillimus, ramis numerosis, floribus copiosis lilacinis in centro sanguineis, colore scil. loborum calycis per petala transparente. Folia 3–4 lin. longa lataque, sessilia, glandulis nigris punctata. Pedicelli, bracteolæ, alabastra præcedentis. Calycis expansi diam. 9–10 lin., lobis 2dæ et 3tiæ seriei argenteo-nitidis, dentium pennulis 3 lin. longis. Antheræ muticæ.

Closely allied to the following, but with smaller leaves and flowers, and differing besides in the lobes and colour of the calyx, and in the fringed petals.

11. **Verticordia grandis**, *Drummond in Hook. Journ.* 1853, p. 119, glaberrima, ramis virgatis gracilibus, foliis imbricatis glaucis orbicularibus planis basi emarginatis tenuiter 5–7-nerviis margine angustè scarioso diaphanis, racemo folioso apice sterili, pedunculis folium æquantibus, bracteolis membranaceis cucullatis infra apicem mucronatis, calycis tubo obconico lævi glabro infernè obsoletè 5-costato, limbo 3-seriali, seriei exterioris lobis 5 deflexis *coriaceis* ovato-oblongis integerrimis tubum æquantibus eique dorso semiadnatis basi contiguis, seriei secundæ lobis 5 petaloideis subspathulatis tubum subæquantibus fimbriato-ciliatis (roseis), seriei tertiæ lobis 5 patentibus purpureis latis truncatis inciso-multidentatis, dentibus palmatim multipartitis roseis nitidis, lacinulis setaceis densè plumoso-ciliatis, petalis obovatis minutè serrulatis, filamentis subulatis, sterilibus antheras muticas subsuperantibus, stylo pollicari compresso infra apicem obtusiusculum pilosiusculo.

Hab. secus Hill River. *Drumm. l. c.* coll. 6. n. 44!

A most splendid species, much resembling *V. oculata* in habit and characters, but of a stouter growth and with larger leaves and flowers, the former being 6–8, the latter 10–12 lines in diameter. The branches are often densely covered for a foot or more in length with scarlet flowers, which however appear never to reach to their top, which continues to grow on, and is thickly covered with leaves only. The beautiful and delicate feather-like divisions of the inner lobes of the calyx are 4–5 lines long, and quite straight. The peduncles are compressed, and show at their top two very short and rounded opposite lobes, which are probably rudimentary exterior bracteolæ. The flower-buds in their bimucronate involucre are globose, rose-coloured, and the latter, cut off as it were at the base, is thrown off later than in other species, either in form of a half-split calyptra, or separated into two cucullate bracteoles.

Obs. From the above descriptions it will be seen that the calyx of *Verticordia* shows a variety of structure sufficiently notable even to suggest the idea of dividing the genus into three or four distinct ones, instead of which however,—and in our opinion quite wisely,—Schauer, the monographer of *Chamælaucieæ* (Nov. Act. Acad. Leopold.-Car. vol. xix. suppl. 2) has only subdivided it into three sections, characterized partly by the structure of the calyx and partly by that of the anthers As however the anthers show but very minute and (except in two species only, viz. *V. grandiflora* and *nobilis*) by no means striking characters, we should have thought it preferable to establish the sections chiefly, if not exclusively, on the structure of the calyx, according to its having three or two or only one series of lobes or appendages. Of these different series of lobes, the innermost, and often the sole existing, *i. e.* that whose lobes alternate with the petals and are always coloured and deeply divided or fringed, is undoubtedly formed by the free ends of the five sepals, and continuous with the tube formed by the coalition of their inferior portion. But what are the lobes of the accessory second and third series? Without presuming to decide this question, I may only say that, instead of regarding them as a second and third whorl of (more or less altered) sepals, we would rather consider them as mere appendages of the calycinal leaves, analogous to those so commonly occurring in *Lythrarieæ*, in certain *Melastomaceæ* (*Otanthera*, Blume; *Leandra*, Raddi; *Melastoma*, &c.), and even in some *Myrtaceæ* (species of *Astartea*, D.C.; *Lophostemon*, Schott), or to the scales on the calyx of certain species of *Osbeckia*, although the fixity of their number and position (those of one series constantly alternating in the most regular manner with those of the next series) would perhaps speak against our opinion; while on the other hand the 10-lobed, 2-seriate calyx of *Pileanthus*, and the doubled, trebled, quadrupled, or even more increased number of stamens in the plurality of genera of *Myrtaceæ*, seem to indicate a tendency in this order to multiply the number and most probably also the series or whorls of these organs. At all events, that interpretation of the appendages in question which Dr. Schauer has given in his Monograph, appears, to say the least, very unsatisfactory and arbitrary. What I have designated (in *V. chrysostachys*, *oculata* and *grandis*) as the lobes of the first series, Dr. Schauer mentions (though only *en passant*, in the description of *V. Lindleyi*, *pennigera* and *Drummondii*) under the name of "*ungues loborum*" (they are distinctly figured on his tab. 4. B. fig. 8, 9. litt. *b*), although they evidently do not originate from the base, but from the upper part of the calyx, and always have their apex free, not adnate to the tube. What I have described as the reflexed and fringed membranous or petaloid lobes of the second or middle series in *V. chrysostachys*, *oculata* and *grandis*, and of the first or exterior series in *V. callitricha* and *ovalifolia*, exist in the whole section *Catocalypta*, and are correctly figured by Schauer (t. 4. B. fig. 10); but these lobes are considered by him as an *involucre* (!), and described as originating from the "margo exterior loborum," whereas in reality they distinctly spring from the narrow sinus *between* the lobes, and are perfectly free from the latter: nor do they adhere to the base of the calyx, except in *V. insignis*, and even here but very slightly. The idea of *an involucre springing from the limbus calycis* is certainly new, but altogether untenable. According to the differences of the calyx above mentioned, I would propose to divide the genus *Verticordia* into the following four sections:—

I. EUVERTICORDIA, nob. Calycis limbus 1-serialis.

To this belong Schauer's whole Sect. I. *Euverticordia* and III. *Chrysoma*, and our *V. nobilis* and *stelluligera*.

II. VERTICORDELLA, nob. Calycis limbus 2-serialis, serie mediâ deficiente, exterioris lobis reflexis integerrimis tubo semiadnatis, &c.

Of this section I know only *V. Drummondii*.

III. CATOCALYPTA, Schauer. Calycis limbus 2-serialis, serie primâ (lobis reflexis integris, &c.) deficiente, &c.

To this belong all the species of Schauer's second section, and our *V. callitricha* and *ovalifolia*.

IV. PENNULIGERA, nob. Calycis limbus 3-serialis, &c.

Of this we know only the three last species here described, *V. chrysostachys*, *oculata* and *grandis*.

12. CHAMÆLAUCIUM DRUMMONDII, *nob.*, glabrum, foliis sparsis passimque oppositis linearibus triquetris minutè mucronulatis subtùs obtusè carinatis margine densè ciliatis carinâ glabrâ, corymbis densè multifloris, floribus subsessilibus, calyce turbinato 10-nervio demùm basi obsoletè 10-costato, limbi lobis ovalibus obtusis minutè ciliolatis, petalis sessilibus orbicularibus minutè ciliato-serrulatis calycis lobos dimidio superantibus, filamentis fertilibus basi dilatatis sterilibusque ligulæformibus subæqualibus, stylo stamina superante petala æquante, stigmate capitato coronâ pilorum cincto.

Hab. in planitie arenosâ prope Colbourn Springs. *Drummond in Hook. Journ.* 1853, p. 119. coll. 6. n. 41!

Frutex 2-pedalis. Rami virgati, ramulis gracilibus subcorymbosis. Folia 3–4 lin. longa, $\frac{1}{3}$–$\frac{1}{2}$ lin. lata, obtusiuscula cum mucronulo minuto subrecurvo, suprà plana v. subconcava, marginis ciliis albidis latitudinem folii subæquantibus, punctis glandulosis prominulis fuscis utrinque satis copiosis.

Corymbi capitulum hemisphæricum simulantes, magnit. cerasi majoris, floribus albis demùm roseis, magnit. *Verticordiæ insignis.* Bracteolæ caducæ.

From *Ch. ciliatum* and *virgatum* this is easily distinguished by the ciliated leaves and petals; from the former, moreover, by the subcapitate and larger flowers, the bearded stigma, &c.; from the latter by the ciliated lobes of the calyx, smaller leaves, &c.

13. CHAMÆLAUCIUM AFFINE, *nob.*, glaberrimum, foliis oppositis subfiliformibus semiteretibus recurvo-mucronulatis dorso convexis marginibus obtusis, corymbis paucifloris laxiusculis, pedunculis folio parùm brevioribus, calyce obovato leviter 10-costato, inter costas infernè minutè foveolato, lobis brevissimis semilunaribus margine subscariosis petalisque latè obovatis integerrimis, filamentis subulatis basi dilatatis sterilia conformia brevè superantibus stylum æquantibus, stigmate capitato basi barbulâ cincto. *Drumm.* coll. 6. n. 40!

Folia semipatentia, stricta, parùm rigidula, 8–12 lin. longa, $\frac{1}{3}$–$\frac{1}{2}$ lin. crassa, floralia conformia sed breviora. Pedicelli 2–3 lin. longi, crassiusculi, deflorati apice truncato-subbilobi.

This seems to be the plant mentioned by Drummond in Hooker's Journ. 1853, p. 118. in these words:—"By far the largest shrub of the order known to me is found on sandy ground on all the rivers, from the Moore to the Irwin; it grows from 15 to 20 feet high, bearing numerous corymbs of large lilac flowers; the sepals are broad and very short, without cilia," &c. It differs from all the other species in its thin and longer leaves, and from *C. uncinatum*, Schauer, which seems to be its nearest relation, by the larger petals, the rounded (not truncate) lobes of the calyx, and the antheræ being not apiculate.

14. PILEANTHUS FILIFOLIUS, *nob.*, glaber, foliis oppositis tereti-v. semiteretifiliformibus subpollicaribus obtusis muticis, pedunculis in summis axillis solitariis 1-floris folia æquantibus, involucro calyptræformi bicornuto prope basin circumscisso, basi persistente brevi turbinata leviter 5-crenatâ, calyce obovato-oblongo ecostato flavido-sericeo basi attenuato, limbi lobis 10 biseriatis obovato-subrotundis minutè serrulatis, petalis obovato-oblongis unguibus latis nudis, laminâ subrotundâ brevè ciliatâ, antherarum loculis connectivo lato subdivaricatis, stylo stigmateque simplici glabris.

Hab. cum præcedente. *Drumm.* coll. 6. n. 42!

Rami graciles, laxiusculè foliosi. Folia 6–11 lin. longa, $\frac{1}{3}$ lin. crassa, lætè viridia, parcè glanduloso-punctata. Alabastra obovata, ferè 4 lin. longa, involucri a basi demùm fissi bracteis 2 suprà cohærentibus, marginibus tamen distinctè conspicuis. Petala lilacina v. rosea, 4 lin. longa.

Very distinct from *P. limacis* and *pedunculata,* especially in the leaves and involucre.

15. Calycothrix tenuifolia, *nob.*, glaberrima, ramulis lævibus, foliis semipollice brevioribus acutè triquetro-filiformibus obtusis muticis demùm semipatulis, floribus infra apicem ramulorum axillaribus subsessilibus 20-andris, bracteolis scariosis oblongis cuspidatis vix basi connatis subcarinatis, calycis tubo bracteolas demùm parùm superante angulato, lobis subrotundis acuminatis, aristis petala (rosea) dimidio superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 57!

Folia 3–4 lin. longa, ¼ lin. lata, recta, sessilia, opposita et sparsa. Flores in spicam circ. pollicarem foliosam comatam congesti, calycis tubo 3–4 lin. longo, setis 5–6 lin. longis. Petala lanceolato-oblonga, glabra, staminibus subduplò longiora.

Approaching *C. glutinosa*, Lindl., which differs by 10-androus flowers, &c., and *C. tenuiramea*, Turcz., which differs in having no stipules, pointed leaves, connate and ecarinate bracteoles and ciliolate aristæ.

16. Calycothrix rosea, *nob.*, glaberrima, ramulis densè cicatrisato-tuberculatis, foliis imbricatis semipollicaribus triquetro-linearibus acutiusculis muticis dorso obtusis, floribus infra apicem ramulorum paucis axillaribus subsessilibus folia vix superantibus, bracteolis scariosis vix basi connatis oblongis attenuato-acutis subcarinatis, calycis tubo bracteolas subdimidio superante angulato, lobis emarginato-subrotundis, aristis petala (rosea) vix dimidio superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 56!

Folia 5–7 lin. longa, ½ lin. lata. Spicæ breves, capitulum comatum mentientes. Stamina 20 v. plura, petalis ovato-oblongis acutis glabris sanguineo-roseis dimidio breviora.

Very near the preceding species, but easily distinguished by the larger, blunter, adpressed leaves, &c.

17. Calycothrix lasiantha, *nob.*, foliis nanis triquetro-linearibus obtusis muticis semipatulis ramisque lævibus puberulis demùm glabratis, racemis terminalibus multifloris, bracteolis cum pedicello brevissimo folium subæquantibus basi connatis ovali-oblongis acutis medio puberulis apice subcarinatis divergentibus, calycis tubo bracteolis triplò longiore puberulo infernè angulato, lobis ovatis setaceo-acuminatis plumoso-pilosiusculis corollâ (roseâ v. lilacinâ?) extùs puberulâ parùm brevioribus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 53!

Folia opposita et sparsa, 1½–2 lin. longa, ¼ lin. lata, stipulis exiguis caducis. Calycis tubus 4–5 lin. longus, tenuis, eglandulosus. Petala 3 lin. longa, oblonga, acuta, eglandulosa. Stamina 20 v. plura.

A very pretty species, resembling certain *Tremandræ*, and allied to *C. breviseta*, Lindl. and *C. strigosa*, Cunn., but quite distinct.

18. Calycothrix brevifolia, *nob.*, glaberrima, foliis nanis triquetro-oblongis obtusis submuticis, floribus infra ramorum apicem paucis axilla-

ribus, pedicello folium subæquante, bracteolis subcoriaceo-scariosis obovatis infra medium connatis brevè mucronato-acuminatis haud carinatis, calycis tubo tereti bracteolas vix dimidio superante, lobis scariosis rhombeo-orbicularibus, aristis corollam (roseam) duplò superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 58!

Folia 1–1½ lin. longa, ½–¾ lin. lata, brevissimè petiolata, margine dorsoque acutiuscula, glanduloso-punctata, interdùm minutè mucronulata, passim subrotunda. Bracteolæ rubræ, medio dorso virides et glanduloso-punctatæ, 2½ lin. longæ. Calycis tubus ruber, eglandulosus, lævis, aristis capillaribus 6–7 lin. longis. Stam. 20. Stipulæ vix conspicuæ, caducissimæ.

This comes near *C. Leschenaultii*, which however differs in having scabrid leaves, carinate bracteolæ, only 8–13 stamens, &c.

19. CALYCOTHRIX DRUMMONDII, *nob.*, glaberrima, foliis erecto-imbricatis unguicularibus acutiusculè triquetro-linearibus subacutis muticis suprà planis, corymbo subterminali densifloro, bracteolis vix basi connatis lineari-lanceolatis complicato-subcarinatis setaceo-acuminatis dimidium calycis tubum vix superantibus, calycis lobis subrotundis acuminatis aristis petala (citrina) glabra dimidio superantibus.

Hab. cum præcedente. *Drumm.* coll. 6. n. 52!

Folia subsessilia, 3–6 lin. longa, ⅓ lin. lata, lævia, obsoletè glanduloso-punctata. Calycis tubus 4 lin. longus, foliis brevior, angulatus, infernè glanduloso-punctatus, lobis scariosis subdecoloribus, aristâ 5 lin. longâ. Petala ovato-oblonga, acuta, glabra. Stamina 20 v. plura.

Closely allied to *C. luteola*, Schauer (in Pl. Preiss. i. p. 106), and perhaps a mere variety of it, differing in longer leaves, keeled bracteolæ, &c.

20. CALYCOTHRIX TENELLA, *nob.*, glaberrima, foliis patentibus semiunguicularibus linearibus complicatis triquetrisve obtusis, mucronulo exiguo deciduo, corymbis subterminalibus paucifloris, bracteolis folio calyceque dimidio brevioribus basi connatis suprà divergentibus lanceolatis carinatis, acumine brevi setaceo recurvo-patulo, calycis tubo angulato, lobis subtruncato-obovatis, aristâ petalis (citrinis) duplò longiore.

Hab. cum præcedente. *Drumm.* coll. 6. n. 55!

Ramuli corymbosi tenelli, leviter et remotiusculè cicatrisato-denticulati. Stipulæ minutæ, setaceæ, caducæ. Folia sparsa, brevissimè petiolata, 2–4 lin. longa, ⅓–½ lin. lata, obsoletè punctata. Bracteolæ 2 lin. longæ, albæ, carinâ viridi, glanduloso-punctatâ. Calycis lobi lutei, aristâ 4–5 lin. longâ. Petala et stam. præcedentis.

Perhaps a mere variety of *C. flavescens*, Cunn. (Fielding, Sert. t. 38), which however differs in the form and length of the bracteolæ, racemose flowers, and ovate acuminate calycinal lobes.

21. CALYCOTHRIX TETRAGONOPHYLLA, *nob.*, ramulis apice puberulis, foliis patentissimis nanis oblongo-linearibus acutiusculè tetraquetris obtusis mu-

cronulatis basi attenuatis minutè ciliolatis demùm glabratis, spicâ subterminali pauciflorâ, bracteolis subliberis angustè lanceolatis setaceo-acuminatis complicatis puberulis, apice subrecurvo patulo, calycis tubo angulato bracteolis vix dimidio longiore, lobis obovato-triangularibus emarginatis, aristâ petala (lutea) dimidio superante.

Hab. cum præcedente. *Drumm.* coll. 6. n. 54!

Ramuli tenues, corymbosi, densè cicatrisato-denticulati. Folia sparsa et opposita, 1–2½ lin. longa, ½ lin. lata, subimpunctata, faciebus glabris. Flores subsessiles. Bracteolæ 2 lin. longæ, virides, margine albidæ. Calycis lobi lutei. Petala glabra. Stamina 20.

This approaches chiefly *C. aurea*, Lindl. and *C. flavescens*, Cunn., but the former differs in having imbricated concave leaves, and the bracteoles as long as the tube of the calyx; and the latter in being glabrous, and in the shape of the leaves and bracteolæ.

22. Calycothrix puberula, *nob.*, foliis imbricatis demùm semipatulis linearibus carinato-triquetris acutiusculis submucronulatis undique hispido-puberulis, corymbis subterminalibus paucifloris, bracteolis erectis calycis tubum subæquantibus subliberis foliaceis puberulis subulato-linearibus complicatis, calycis lobis truncato-obovatis acuminatis, aristâ petalis (aureis) vix dimidio longiore.

Hab. cum præcedente. *Drumm.* coll. 6. n. 51!

Ramuli præcedentis, apice puberuli. Folia sparsa, circ. 3 lin. longa, ½ lin. lata, subsessilia, dorso quasi 2-sulco, mucronulo minuto deciduo, pube patulâ brevissimâ albidâ. Bracteolæ virides, puberulæ, margine albidæ. Calycis tubus circ. 3 lin. longus, angulatus, glaber, lobis luteis suborbicularibus, aristis 3–4 lin. longis. Stamina 20.

This is also closely allied to *C. aurea*, Lindl., but easily distinguished by the leaves, bracteolæ, &c.

Notice of two apparently undescribed species of *Genetyllis*, from S.W. Australia. By Richard Kippist, Esq., Libr. L.S.

[Read November 20th, 1855.]

The *Chamælaucieæ* described by Dr. Meisner in the foregoing paper were all contained in a collection (the 6th) formed by Mr. Drummond during a journey of eighteen months' duration, to the northward of Swan River. On comparing the MS. with the specimens of *Chamælaucieæ* recently presented to the Society by Mr. W. W. Saunders, as well as with those already contained in our herbarium, I was somewhat surprised to find two very distinct and beautiful species of *Genetyllis*, collected by Mr. Drummond in a previous journey to the south of the colony, which appear to be still undescribed. Of these I have prepared the following characters, at the request of Dr. Meisner, he not having been able to obtain access to specimens of the plants. They both belong to the group with enlarged and coloured bracts, of which two very ornamental species have been recently introduced to our gardens, and figured in the number of the 'Botanical Magazine' for July last.

1. GENETYLLIS (*Involucratæ*) FIMBRIATA, erecta, ramosa, glabra; foliis confertis, plerumque oppositis, decussatis, ellipticis, obtusis, suprà convexis, subtùs pallidis, margine ciliatis; capitulis terminalibus cernuis, 8–10-floris; involucro campanulato pollicari; bracteis ecarinatis, elliptico- v. ovato-oblongis, margine fimbriatis; interioribus membranaceis, roseis, apice hiantibus; exterioribus ovatis, herbaceis, quadrifariam imbricatis; bracteolis lanceolatis, acuminatis, carinatis, flores sessiles subæquantibus; calyce ovato-cylindrico, basi lævissimo, crustaceo, minutè punctato, fauce contractâ, corrugatâ, lobis minutissimis; petalis ovatis, acutis, membranaceis; staminodiis filiformibus, filamenta subulata æquantibus; stylo filiformi, longè exserto, apice hispido.

Hab. in Australiâ austro-occidentali. *Drummond*, coll. 5. no. 99!

This appears to be the plant with thyme-like ciliated leaves and large rose-coloured bracts, mentioned by Mr. Drummond (in a letter, dated Cape Riche, Oct. 29, 1848, and published in the 'Journal of Botany' for 1849) as having been gathered by him on Congineerup, in company with another large-bracted *Genetyllis* with heath-like leaves, and bracts without cilia, which I believe to be the following species.

Genetyllis fimbriata may be readily distinguished from all its congeners of the '*Involucratæ*' section by its leaves and bracts both being beautifully ciliated; *G. œderioides*, Turcz., of which the bracts are even more strongly fringed, having entire triquetrous leaves, while those of *fimbriata* are elliptical, revolute, and somewhat like those of *G. citriodora*, but smaller.

2. GENETYLLIS (*Involucratæ*) MEISNERI, erecta, fruticulosa, 2–3-chotomè ramosa, glaberrima; foliis sparsis, patulis, lineari-lanceolatis, acutis, margine revolutis integerrimis, dorso subcarinatis; capitulis terminalibus nutantibus multi- (8–10-) floris; involucri campanulati bracteis interioribus (6–8) elliptico-oblongis, membranaceis, roseis, integris v. apice serrulatis, brevè mucronatis; exterioribus duplò minoribus, subherbaceis, ovatis, longè acuminatis; bracteolis lineari-lanceolatis acutis, floribus sessilibus purpureis vernicosis paullò longioribus; calyce ovato-cylindrico lævi, lobis exiguis petalis ovatis multò brevioribus; filamentis staminodia superanti-; stylo subulato longè exserto, apice barbato.

Hab. cum præcedente. *Drummond*, coll. 5. no. 100! (& 101!).

In the structure of its flowers, and more particularly in the extremely minute and nearly obsolete calyx-lobes, as well as in the form of the style and hispid stigma, this species, which I have much pleasure in naming after the indefatigable author of the paper just read, agrees with the preceding: in habit it most nearly approaches *G. helichrysoides*, Meisn., which, however, is readily distinguished by its smaller size, less branched stems, triquetrous serrulate leaves, gradually tapering bracts, and much more conspicuous elliptical calyx-lobes. No. 101 of Drummond's 5th collection seems to be merely a less luxuriant state of the same plant, with more thinly scattered leaves, and paler bracts and flowers; but I have been unable to detect any difference of structure sufficiently important to justify its separation as a distinct species.

In conclusion, I may, perhaps, be allowed to add a few words, by way of endorsing the opinion expressed by Dr. Meisner in the foregoing paper, viz. that the *Genetyllis macrostegia* of the 'Botanical Magazine' (t. 4860) does not appear to be the plant originally described under that name by Turczaninow; an opinion at which I had arrived prior to the receipt of Dr. Meisner's MS., but which, without such a confirmation, I should scarcely have ventured to express in opposition to those of Dr. Lindley and Sir William Hooker. The former, however, evidently entertained some doubts on the point, as he suggests, when writing on the *Genetyllis tulipifera* (his *Hedarome tulipiferum*), that that plant should be compared with the *G. macrostegia* of Turczaninow. A constant interchange of publications having been carried on between the Linnean Society and the Natural History Society of Moscow, I have fortunately been enabled to refer to Turczaninow's original paper in the 'Bulletin' of that Society for the year 1849; and a comparison of his description (at tome xxii. pt. 2. p. 18) with Mr. Saunders's very complete set of Swan River *Chamælaucieæ*, in which Drummond's Nos. (quoted in the Moscow 'Bulletin,' but omitted by Walpers) have been carefully preserved, and the different series distinguished, as well as with the descriptions and figures of the two species given in the 'Botanical Magazine' for July last, has satisfied me that the plant with broad party-coloured bracts, described and figured at tab. 4858 as a new species, under the name of *G. tulipifera*, is identical with *G. macrostegia*, Turcz.; while the narrow-leaved plant with self-coloured bracts (t. 4860), to which Sir W. Hooker assigns that name, was probably unknown to the Russian botanist, since it does not occur in Drummond's

4th series *, the latest, apparently, which had reached him when writing his "Decas 6ta generum Plantarum hucusque cognitarum," in which the name in question was first promulgated. He there cites, as belonging to his *G. macrostegia*, No. 40 of Drummond's 4th collection; and with the single exception that the leaves are not, for the most part, opposite (a point, by the way, in which these plants vary extremely, even on the same branch), our specimen so numbered corresponds perfectly with his description, as it also does with that of *G. tulipifera*, Hook., in the 'Botanical Magazine.'

The two recently introduced species being very closely allied, and Turczaninow having had only one of them before him when framing his definition, it can hardly be a matter of surprise that much of that definition is equally applicable to both: still it appears to me that, in addition to the very important character already pointed out by Dr. Meisner, "calycis tubo basi *decem*-costato" (while Sir William Hooker states that he can find only *five* furrows in the lower part of the tube of his *G. macrostegia*), there are one or two other points in which it accords better with the *G. tulipifera* of the 'Botanical Magazine' than with the *macrostegia* of that work. For instance, the leaves are described as *broadly* linear; the capitula as *cernuous*; the bracts of the general involucre as *obovate obtuse, thrice as long* as the flowers, "colore purpureo plus minus tinctis," and the partial bracts as "basi roseis, *apice atro-purpureis*;" while in the specimens of No. 98 of Drummond's 5th series, unquestionably identical with the *G. macrostegia* of the 'Botanical Magazine' (for which Dr. Meisner proposes the name *G. Hookeriana*), the leaves are much narrower, the heads of flowers nutant rather than merely cernuous; the bracts of the involucre are elliptical, much less obtuse, and concolorous, scarcely more than twice as long as the flowers (exclusive of the style, which in both species eventually becomes nearly as long as the involucre), and the partial bracts show no indication of the dark purple colour at their tips, which is so obvious in the dried specimens of the broader-leaved plant, as well as in Mr. Fitch's very characteristic figure of it. In this, which I take to be the true *G. macrostegia*, the base of the calyx-tube appears to me rather punctate than transversely rugose; while that of *G. Hookeriana*, Meisn., is distinctly marked between the *five* ribs, with prominent transverse wavy ridges, showing an approach to the peculiar structure which occurs in the lower part of the calyx of *G. diosmoides* and *Drummondii*; the "calycis tubus polyzonatus" of Schauer's Monograph in the 'Nova Acta Academiæ Naturæ Curiosorum,' where (vol. xix. suppl. 2. tab. 2, A. & B.) this structure is very accurately represented.

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* In Drummond's 5th series, both *G. tulipifera* and *G. macrostegia*, Hook. (*G. Hookeriana*, Meisn.), occur, in company with the two very ornamental and well-marked species just described by myself, which surely would not have been overlooked by Turczaninow, had that series, where the '*macrostegia*' of the Bot. Mag. *first* occurs, reached Moscow in time to admit of his inserting them in his paper.

Note on a *Fungus* found imbedded in the Fens of Cambridgeshire.

By the Rev. M. J. BERKELEY, F.L.S. &c.

[Read February 5th, 1856.]

FUNGI are so rare in a fossil state, if indeed any undoubted cases occur before the post-pleiocene period, that no apology need be made for recording so trifling a matter as the present. Moulds are occasionally well preserved in amber, and a diligent search would probably detect species of other groups amongst the vegetable relics in the London clay. In the Museum at Kew there is a specimen of *Polyporus fomentarius*, Fr., communicated from the Fens of Cambridgeshire by the Rev. Mr. Hailstone, where it occurred with bog-oak, and must have been buried for many centuries. The specimen is so perfect that it shows the peculiar substance of the pileus in admirable condition, both as regards colour and texture. It may be remarked, that the specimen, which is attached by the centre and ungulate, is far more strongly laccate than any British individuals which have passed through my hands, and in fact accords perfectly with one which was gathered in Sikkim by Dr. Hooker, and which may be seen in the same compartment of the Museum. It must have been dependent from some large branch, a situation in which the species seldom if ever occurs in Great Britain, and was probably surrounded by a moister atmosphere, in consequence of the prevalence of extensive forests, than exists at present in the same or neighbouring districts.

Notes on *Loganiaceæ*. By GEORGE BENTHAM, Esq., F.L.S. &c.

[Read February 5th and 19th, 1856.]

THE group of plants collected under the name of *Loganiaceæ* can scarcely be said to constitute a natural order, but rather one of those artificial assemblages, which, in the present state of our knowledge of plants, we are obliged to interpose between some of the great families, to receive anomalous genera rejected from them. Our natural orders, with all the improvements they have received from the most philosophical of modern botanists, are yet as dissimilar in definiteness of circumscription and apparent conformity to nature, as they are in extent. Some indeed, including the two most numerous of all, are so well characterized as to admit of no doubt. The *Cruciferæ*, *Leguminosæ*, *Umbelliferæ*, *Compositæ*, *Labiatæ*, *Palmæ*, *Orchideæ*, *Cyperaceæ*, *Gramineæ*, and several others, comprehending two-thirds of the known species of plants, are admitted by all botanists without any variation, and although, amidst the thousands of species comprised in each, there may be some one or two which may offer an exceptional character or anomalous structure, indicating some slight approach to other groups, yet we cannot have the least hesitation as to where to draw the line of demarcation. The Himalayan *Megacarpæas*, although polyandrous, are still decidedly Cruciferous, not Capparideous. The distinction between *Leguminosæ* and *Rosaceæ*, although so difficult to be expressed in words, is yet so clearly defined, that we find no single genus or species ever considered as intermediate, and although the passage from the former into *Terebinthaceæ* through *Copaifera* and *Connarus* be really more gradual, yet it is still between those two genera that the limits are placed by universal consent; so are they as irrevocably fixed between the closely allied genera *Teucrium* and *Vitex*, which form the connecting link between *Labiatæ* and *Verbenaceæ*. The vast orders of *Umbelliferæ* and *Compositæ* are equally isolated, notwithstanding the anomalous inflorescences of *Horsfieldia* and some others in the former and *Xanthium* in the latter, which at first sight disguise their characters. The few species of *Apostasieæ* are but anomalous *Orchideæ*, rather explaining their structure than connecting them with any particular order. *Cyperaceæ* and *Gramineæ* retain their typical structure through all the singular modifications hitherto observed.

There are other orders again, even amongst the most numerous in species after the *Compositæ* and *Leguminosæ*, which are admitted on all sides to be natural, but upon whose precise limits few botanists can be made to agree, an almost continuous chain of intermediate groups connecting them with adjoining ones. Here the severance has generally been made wherever the links have appeared the weakest; but as these weak points have been variously appreciated by different minds, and no definite standard has been adopted for testing them, the greatest uncertainty has been the consequence. *Malvaceæ* are connected with *Tiliaceæ* by numerous genera which some would unite into one intermediate order, whilst others consider them as constituting from two to six or seven independent ones, and others again propose uniting more or less of these groups with *Malvaceæ*. The *Memecyleæ* are in the eyes of some botanists one or two intermediate families between *Melastomaceæ* and *Myrtaceæ*, whilst for others they are but a tribe of the former. So it is with the connecting groups between *Myrtaceæ* and *Passifloreæ*, between the latter and *Cucurbitaceæ*, &c. Amongst some of the largest and most universally recognized Monopetalous orders the connexion is still more gradual and the limits proposed more arbitrary. There can be no doubt that *Rubiaceæ*, *Apocyneæ*, *Gentianeæ*, and *Scrophularineæ* are large independent orders indicated in nature, yet those genera now amalgamated under the name of *Loganiaceæ* bind them so firmly together, that some of these genera will be found even more closely allied to certain others of each of the above orders respectively than they are to each other. On the other side, *Scrophularineæ* themselves pass imperceptibly into *Solaneæ*, *Bignoniaceæ* or *Convolvulaceæ*, and through these into several others.

Since the metaphor of a chain or linear series has been found inadequate for the illustration of the connexion of the natural groups, that of a geographical area or map has been more generally resorted to. In following out this idea, we may compare the natural system to an extensive country more or less densely wooded. Here the *Compositæ*, *Leguminosæ*, and other well-defined orders may be represented by dense forests clearly separated from all others by open spaces all around them, although here and there a solitary tree or a small cluster may stand a little out from the general boundary-line. The *Malvaceæ* and *Tiliaceæ*, the *Melastomaceæ* and *Myrtaceæ*, the *Myrtaceæ* and *Passifloræ*, these again and the *Cucurbitaceæ* would not be separated by any clear open space, but by a tract still wooded, but of less density, in which here and there the trees would be so thinly scattered as almost to break the connexion. So the above-mentioned Monopetalous orders, the *Rubiaceæ*, *Apocyneæ*, *Gentianeæ*, and *Scrophularineæ* would be typified by large and dense woods rather widely separated from each other, but the intervening space would be dotted over with solitary trees or small clusters representing our *Loganiaceæ*. Many of these may be very near to the surrounding woods, and considerable clear spaces may intervene between some of them; yet, in mapping out the country, it may be more convenient to draw the line close round the frontiers of the whole space, than to portion it out into projecting parcels annexed to the adjoining woods.

On a careful examination, it will be found that almost the whole of the *Loganiaceæ* lie very near to some part or other of the vast field of *Rubiaceæ*, although by their free ovary they are absolutely and with very few exceptions clearly separated. The connecting genera with *Apocyneæ*, *Gentianeæ*, and *Scrophularineæ* are on the other hand much fewer, but the union is much closer. With *Scrophularineæ* in particular, although the general affinity is more remote, the few intermediate genera and species are intermediate in every respect, in habit as in technical character. The main distinction, the presence of stipules in *Loganiaceæ*, disappears very gradually, and the difficulty of drawing the line is the greater from there being no general habit or family resemblance to unite the several members of the *Loganiaceæ*. A somewhat arbitrary decision is therefore here unavoidable, and we can only direct our best endeavours to the adoption of that demarcation which shall interfere the least with the circumscription of the allied orders.

Opposite leaves, interpetiolar stipules (represented occasionally by a mere line connecting the petioles), epipetalous stamens alternating with the lobes of a regular gamopetalous corolla, a free ovary divided into two or rarely more cells, a style cleft at the top into as many lobes, an axile placentation and albuminous seeds with a comparatively small straight embryo, may be said to be the main features of *Loganiaceæ*; and wherever these characters can be undoubtedly recognized, there will be no difficulty as to the identification of the order. But where the stipules become rudimentary, the case is very different, and secondary characters, such as æstivation of the corolla, regularity in the flower, dehiscence of the capsule, peculiarities of placentation variously combined, must be resorted to, as will be seen when we come to examine into the various tribes into which the order is divided.

In DeCandolle's 'Prodromus' eleven distinct tribes are adopted, showing but little of that philosophical method which usually characterized his systematical works. This was, however, the natural consequence of the process by which the amalgamation was formed. A number of detached genera rejected from very different orders were provisionally associated with others which had been published by various botanists as separate families; and as the materials he possessed did not admit of his taking a comprehensive view of the whole, he thought it necessary to retain as tribes whatever had been established as orders, adopting as essential those characters which had occasioned their separation from *Apocyneæ*, *Gentianeæ*, or other free Monopetalous orders. As they were now, however, brought into contact with a new set of affinities, many of these characters became much altered in value. Thus, æstivation of the corolla, for instance, is of great value among *Scrophularineæ*, *Apocyneæ*, and their allies, in the distinction of tribes or even of orders, but among *Rubiaceæ* is available for little more than for the separation of genera; and as long as *Loganiaceæ* were thought to be most closely connected with the former families, near which the elder DeCandolle placed them, he very naturally attached great importance to this character. But now that we bring them into contact rather with *Rubiaceæ*, that importance, as observed by Alphonse DeCandolle in his notes, becomes much lessened in our eyes. Regarding indeed *Loganiaceæ*, as now generally admitted, as *Rubiaceæ* with a free ovary,—a sort of artificial offset from that family, it appears to be the more philosophical as well as the more practically convenient course, to divide them as nearly as possible according to the same principles as those adopted in classing *Rubiaceæ* themselves.

Of the thirteen tribes adopted by DeCandolle in the division of *Rubiaceæ*, there are a few, founded chiefly on number of parts, which subsequent experience has not confirmed. But the most important, artificial as they are in some respects, are yet by far the best that have been proposed. And if the whole number be thus reduced to seven, or perhaps eight, it will be found that the four largest of them have a close parallel among *Loganiaceæ*, as may be seen by the following comparative statement:—

			RUBIACEÆ.	LOGANIACEÆ.
Ovules several in each cell.	Seeds winged...	Flowers numerous on globular receptacles	Naucleeæ.	......
		Flowers distinct	Cinchoneæ.	Antonieæ.
	Seeds not winged...	Fruit capsular.........	Hedyotideæ.	Euloganieæ.
		Fruit succulent, indehiscent..............	Gardenieæ.	Fagræeæ.
Ovules solitary, or rarely two collateral.	Fruit succulent		Coffeeæ.	Gærtnerieæ.
	Fruit dry	Stipules interpetiolar, not foliaceous	Spermacoceæ.	......
		Stipules similar to the leaves, forming a whorl with them...	Stellatæ.	......

The nearest approach to *Spermacoceæ* among free *Monopetalæ* must be sought for among *Verbenaceæ*, although I am not aware of any of them having a sufficiently marked tendency to stipular appendages and regular flowers to be referred to *Loganiaceæ*, and I know of no genera whatever with free ovaries representing either *Naucleeæ* or *Stellatæ*.

The following table will best show the double arrangement of the known genera of *Loganiaceæ* according to the nature of the fruit, or according to the æstivation of the corolla:—

	Æstivation contorted.	Æstivation valvate.	Æstivation imbricate.
ANTONIEÆ.		Antonia. Usteria. Norrisia.	Gelsemium.
EULOGANIEÆ.	Geniostoma.	Spigelia. Mitreola. Mitrasacme.	Polypremum. Logania. Gomphostigma. Nuxia. Chilianthus. Buddleia.
FAGRÆEÆ.	Desfontainea. Fagræa. Potalia. Anthocleista.	Strychnos. Brehmia. ? Labordea.	Nicodemia.
GÆRTNERIEÆ.		Gardneria. Pagamæa. Gærtnera.	

I shall now proceed to enter into some details with regard to each of these tribes and genera.

Tribe I. ANTONIEÆ.

Of the *Antonieæ*, or *Cinchoneæ* with a free ovary, we have four genera. Three of them, the South American *Antonia*, the African *Usteria*, and the Asiatic *Norrisia*, each with a single species, agree with some of the smaller-flowered Cinchonas in inflorescence, in the valvate æstivation of the corolla and general habit; the fourth, *Gelsemium*, North American and Asiatic, corresponds with *Manettia* in its climbing habit, inflorescence, and imbricated (quincuncial) æstivation of the corolla. In all, the stipules are much less developed than in the corresponding Rubiaceous genera, being almost reduced to an elevated line connecting the stipules, and thus showing some approach to *Apocyneæ*.

1. ANTONIA, *Pohl.*

The peculiar characters of this plant consist in the numerous imbricated bracts surrounding the calyx, the short tube of the corolla, and the broad peltate placentæ, producing numerous ovules, of which only one or two in each cell are ever found to enlarge into seeds. It has been hitherto supposed that there are two species, the one glabrous, the other more or less hairy, especially on the under side of the leaves; but the numerous specimens we now possess from various parts of Brazil and Guiana show a gradual passage from the one into the other, and it is seldom, even in Pohl's original specimens, that the under side of the leaves is absolutely without hairs.

2. USTERIA, *Willd.*

The great development of one lobe of the calyx, a circumstance of which several examples exist in *Rubiaceæ*, and the constant abortion of three out of the four stamens, afford good generic characters in *Usteria*, although they do not appear of sufficient importance to separate this single species into a distinct tribe. The corolla, excepting in the number of its parts, and the placentas, are as in *Norrisia*, with the capsule and seeds common to that genus and *Antonia*. With regard to the reduction of the stamens, it cannot be considered as any approach to the irregular flowers of *Scrophularineæ*, as it shows no tendency to didynamy, but it is rather one of those exceptional anomalies such as that observable in *Carlemannia* among *Hedyotideæ*, where the stamens are reduced to two, without any irregularity in the corolla.

3. NORRISIA, *Gardn.*

Well described by Gardner, this plant differs from *Antonia*, with which Wight proposed to unite it, in the want of the imbricated bracts, in the slender tube of the corolla, and in the linear placentæ. Gardner describes and Wight figures the embryo as reversed with the radicle uppermost, contrary to what we observe in all allied *Cinchoneæ* and *Antonieæ*; but this may be a mistake. The seeds of Griffith's specimens are almost all loose, and the two ends are generally so exactly alike, that it is very difficult in dissecting to be certain which end really lie uppermost in the capsule.

4. GELSEMIUM, *Juss.*

This genus, most accurately described and properly placed by Alph. DeCandolle in the 'Prodromus,' corresponds, as already observed, very closely with *Manettia*, but differs from all *Rubiaceæ* and *Loganiaceæ* known to me in the bifid lobes of the style. That this character, however, when it does occur, is of not more than generic importance is evidenced by the analogous case of *Cleonia* among *Labiatæ*. One only species, from North America, has hitherto been referred to *Gelsemium*, but I have no hesitation in adding to it as a second species a plant gathered by the late Major Champion in Hong Kong and by Blume in Sumatra. Gardner, in describing Major Champion's specimens under the name of *Medicia elegans*, did not fail to observe its affinities with the old *Gelsemium*, but, not having specimens to compare, thought himself justified in distinguishing it generically, 1st, "by its imbricated not quincuncial æstivation of the corolla," which, however, is decidedly quincuncial in the Chinese as in the American plant; 2nd, by its "inflated capsule," which certainly is more inflated and less coriaceous in the Chinese species than in *G. nitidum*, but this is a character of degree, which appears rather specific than generic; 3rd, by its "numerous peltate compressed seeds, surrounded on all sides by a broad inciso-dentate membranous wing." I have no seeds of *G. nitidum*, but Alph. DeCandolle describes them as "erecta, compressa, minutissimè muricata, infernè breviter marginato-alata, apice in alam amplam obliquè oblongam expansa, hilo laterali paullò inferiore inter alam superiorem et marginem inferiorem." This agrees with the seeds of the Chinese plant, except that in the latter the wing is nearly equal in breadth all round, with a slight interruption near the hilum. These trifling differences do not at all appear to me sufficient to warrant the generic separation of two species in other respects so similar. The climbing habit, the texture of the leaves, the form of the corolla are the same. In the Chinese plant the leaves are rather broader, the inflorescence looser, more regular and more generally terminal, and the bracts, which are only to be found at the ramifications of the cyme, are smaller. But in *G. nitidum*, although the peduncles are generally axillary, but little branched with numerous bracts, yet they vary much in all these respects. The real specific distinction lies in the capsules, which are very turgid and blunt in the Chinese plant, more compressed and ending in a prominent point in the American one. The flowers of the former are also smaller, and the fleshy base on which the ovary rests is less prominent. I have only seen the capsules of *G. nitidum* in two specimens; in one they are of a hard texture and about 9 lines long; in the other they are much thinner and barely half that size, but had perhaps dried up before arriving at maturity. In both cases the seeds had been already shed.

I have not seen the Sumatra plant published by Blume under the name of *Leptopteris Sumatrana*; but neither in his description, nor in his figure of the flower and its analysis can I find anything to distinguish it specifically from the Hong Kong plant.

Tribe II. EULOGANIEÆ.

This, the original group upon which the order was constituted, presents also in the strongest degree its peculiarities and difficulties. Representing on the one hand the *Hedyotideæ* among *Rubiaceæ*, and passing into them by the most gradual steps through *Houstonia*, it is, on the other hand, as closely connected through *Buddleieæ* with *Scrophularineæ*, and through *Geniostoma* forms the nearest approach to *Apocyneæ*. Towards *Rubiaceæ*, a slight adherence of the ovary at its base will perhaps justify the including *Houstonia*, as proposed by Torrey and Gray, within the boundaries of that family, to the exclusion of *Spigelia* and *Mitreola*; but, on the opposite extremity, I see no way of establishing a distinctive character between *Loganiaceæ* and *Scrophularineæ* without bringing over *Buddleia* and its allies into the domain of the former. The æstivation, upon which I had formerly relied, under the mistaken supposition that it was, as described by Endlicher, contorted in *Logania* as in *Geniostoma*, proves of no avail. I had then overlooked the observations of Alph. DeCandolle, which I have since verified in a number of species, that it is imbricated with one external lobe in *Logania* as in *Buddleia*. The stipules are occasionally reduced in *Logania* to a slight connecting line, which always exists in *Buddleia*, and in some species is expanded into foliaceous appendages, which, although not called by the name of stipules, appear to be of the same nature. The capsules and seeds are essentially the same in both genera, and even in inflorescence and general habit some species of *Logania* differ very little from *Gomphostigma* and some of the entire-leaved *Buddleias*. It is true that most species of the latter genus have dentate leaves, an element hitherto unknown in *Loganiaceæ*, and till lately also in the vast family of *Rubiaceæ*; but now, in the instance of *Carlemannia*, we are obliged to admit dentate leaves as an exceptional character in *Hedyotideæ*, and by analogy we cannot exclude it from *Euloganieæ*. The line of demarcation between *Loganiaceæ* and *Scrophularineæ* cannot therefore be drawn between

Logania and *Buddleia*. Either *Logania* must be transferred to *Scrophularineæ* and a new name be given to the free *Rubiaceæ*, or *Buddleia* and its allies must be brought over to *Loganiaceæ*. I should prefer the latter course, for I think that better characters can thus be given to the two orders. The irregular more or less personate corolla, sometimes indicated only by its bilabiate æstivation or by the absence of one or of three of the stamens, and the absence of any stipular connexion between the petioles, would be indicative of *Scrophularineæ*, and any trace of stipules accompanied by a regular corolla isomerous with the stamens and quincuncial in æstivation would refer to *Loganiaceæ*. It is true, there would even then remain some intermediate genera among *Scoparieæ*, where the quincuncial passes gradually into the bilabiate æstivation, the regular into the personate corolla, but the absence of the stipular line and the tendency to alternation in the leaves would leave these among *Scrophularineæ*. So also *Microcarpæa* and *Bryodes*, which I had included among *Buddleieæ*, would, notwithstanding the presence of the connecting line and a general resemblance to some *Mitrasacmes*, be rejected from *Loganiaceæ* on account of their diandrous or didynamous flowers.

The approach to *Apocyneæ* is indicated in *Geniostoma* by the contorted æstivation of the corolla, and in *Mitrasacme* by the partial separation of the ovaries, whilst the styles are joined at the apex; but, as in neither instance are the two characters combined, there is little hesitation as to their retention within the boundary-line of *Loganiaceæ*.

Several of the *Euloganieæ* had been formerly placed among *Gentianeæ*, but have been judiciously rejected by the able monographist of that order on account of their axile placentation, besides that they want the bitter principle so universal in *Gentianeæ*. It is true that the *Rubiaceæ* also include a few genera (such as *Gardenia*, *Amaioua*, &c.) where the placentation is parietal, as an exception to the almost universal central placentation of the order; that this exceptional character shows itself occasionally also in the corresponding genus *Fagræa*, and that it cannot in either case be treated as even of tribual importance; yet here, among free capsular *Monopetalæ*, we must give it a much higher value, in order to find a tangible character for the definition of such an eminently natural family as the *Gentianeæ*.

Although æstivation of the corolla does not in *Loganiaceæ* any more than in *Rubiaceæ* afford good tribual characters, yet in both instances it is a convenient one for the subdivision of the tribes.

Accordingly in *Euloganieæ* we may distinguish three groups: the first with a valvate æstivation, corresponding with *Hedyoteæ*, includes the American *Spigelia*, the American and East Indian *Mitreola*, and the Australian and Indian *Mitrasacme*; the second with an imbricate quincuncial æstivation, approaching *Scrophularineæ*, comprises the Australian *Logania*, the North American *Polypremum*, the South African *Gomphostigma*, *Nuxia* and *Chilianthus*, and the almost cosmopolitan *Buddleia*; the third, with a contorted æstivation like that of *Apocyneæ*, is limited to the Asiatic and Australian *Geniostoma*.

5. Spigelia, *Linn.*

This genus, in its habit, inflorescence and broad capsule, closely corresponds with *Ophiorrhiza* among *Rubiaceæ*. The peculiar dehiscence of the capsule and the articulate style are its readily recognizable characters, and the species are well worked up by Alph. DeCandolle in the 'Prodromus.' Since then, few if any really new ones have appeared, nor have we more than one in the herbaria I have access to. There are, however, several described species to suppress. Some of the perennial herbaceous species will flower the first year, so as in that state to have been described as annuals, and it would seem that the common herbaceous ones have usually a large- and a small-flowered variety. *S. anthelmia*, a common weed in tropical America, includes *S. nervosa* and *S. multispicata* of Steudel, which are not even marked varieties; my *S. Schomburgkiana* is the same as *S. Humboldtiana*, and *S. Mexicana* seems to be but the larger-flowered form of the same species. My *S. humilis* varies in the same manner in the length of the flowers both in Spruce's and in Schomburgk's specimens. *S. gracilis*, DC., is the same as *S. spartioides*, Cham. et Schl. I am unacquainted with the two Mexican plants of Galeotti, described by Martens as new *Spigeliæ*, for I cannot find them in Sir W. Hooker's herbarium, whose set is in general nearly complete.

6. Mitreola, *Linn.*

This genus, well characterized by Torrey and Gray and by Alph. DeCandolle, very closely resembles some species of *Oldenlandia*; but the ovary is free, and the two-horned capsule readily distinguishes it from all others. The styles, separating at the base whilst they still adhere under the stigma, recall a very common structure in *Apocyneæ*, with which, however, *Mitreola* has little else in common. Four species are described in the 'Prodromus,' and a fifth is added by Zollinger and Moritzi in their Catalogue of Java plants, but of these, *M. paniculata,* supposed to be common to Brazil and India, appears to have been founded on insufficient materials. All Gardner's Brazilian specimens which I have seen have the fruit and all other characters of *M. petiolata,* which has a wide range from the Southern United States over the West Indies to equatorial America, whilst Wallich's Indian specimens do not appear to differ from his *M. oldenlandioides**. It is to that species also that I would refer Zollinger's plant. It has a much larger capsule than *M. petiolata,* narrowed at the base, with longer horns, which, as the fruit enlarges, become very broadly divergent at the base; the pod of *M. petiolata* is smaller, more globular, and the short horns, at first erect, diverge but slightly as the fruit enlarges. In both species the horns often curve more or less inwardly, but more so in *M. petiolata* than in the majority of specimens of *M. oldenlandioides,* and in neither is it a constant character. The seeds of the American species are always much broader than in the Indian one, although both vary in this respect. To these annuals I have to add a very distinct perennial species gathered by Drs. Hooker and Thomson in Khasiya.

7. MITRASACME, *Labill.*

Mitrasacme is closely allied to *Mitreola* in flowers and in fruit, and partakes of its affinities. The technical distinction, consisting in its tetramerous, not pentamerous flowers, is however accompanied by a difference in habit which approaches rather to that of some slender Gratioloid genera than to *Oldenlandia,* which, in that respect, is its Rubiaceous representative. The capsule is also more variable in form than in *Mitreola,* and the tube of the corolla is occasionally elongated. I find the æstivation of its lobes always valvate, as suspected by Alph. DeCandolle.

Nineteen Australian species distributed in four divisions were enumerated by Brown. To these have since been added four Australian ones, of which, however, two only prove to be really distinct from Brown's, and three Asiatic species published under eight names. I shall now describe three more from Australia which I find in our herbaria; but as I propose to reduce to varieties three of the older species, the total number now stands at twenty-four.

Brown's divisions have been adopted by subsequent botanists as sections, under names given by Don or by Endlicher; but a few only of his species have been hitherto accurately identified, our herbaria not generally possessing authentic specimens. As I have now had an opportunity of seeing nearly the whole of them in the Banksian herbarium, I subjoin a few notes derived from a cursory inspection of the original specimens, and a more detailed examination of such as are contained in the herbaria at Kew.

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* In Wight's 'Icones,' t. 1601, a curious mistake of the artist has occurred in the flowers of the general figure of *M. paniculata*; the analysis, however, drawn by Dr. Wight himself, correctly represents the true structure.

Brown's fourth division (*Plecocalyx*, Don) is limited to the single *M. ambigua*, a small slender plant with the habit of some other annual *Mitrasacmes*, but the four small lobes of the calyx are somewhat dilated and concave. The corolla is very small with a slender tube. The second division (*Dichelocalyx*, Don) has only two dilated and concave lobes to the calyx, which has a truncate or two-horned aspect; the two other lobes are usually entirely abortive, although in some luxuriant specimens of *M. paradoxa* I have seen very minute traces of them. This section consists now of two or three species; the original *M. paradoxa*, Br., which includes *M. divergens*, Hook. fil.; the *M. distyla*, F. Müll., a minute species remarkable for its styles entirely free; and *M. nuda*, Nees ab E., closely allied to *M. paradoxa*, but which, from the specimens of Preiss's which I have seen, I cannot venture to unite with that species.

Brown's third division (*Hologyne*, Don) is distinguished by the style not split at the base till after flowering. This is not an easy character to ascertain, for the separation takes place very soon after fecundation, and I have sometimes opened several flowers before finding one in which the styles appeared perfectly joined. Brown's *M. connata*, the only species he refers to the division, is in other respects so closely allied to *M. elata*, and the *M. nudicaulis* to *M. pygmæa*, that I have no hesitation in proposing that the first and third divisions be united into one section under Endlicher's name *Mitragyne*; the more so, as the two Indian species with styles connate from the base have the stigma decidedly two-lobed, not entire as in *M. connata*.

Of the sixteen species referred by Brown to his first section, we easily recognize in our herbaria the *M. elata*, remarkable for its long corolla; as in *M. connata*, the tube varies from 4 to 6 lines in length. *M. stellata* appears to vary in its leaves ovate-oblong or linear-lanceolate, smooth or hairy, but to be always known by its dense umbels of small flowers, either solitary or several together forming a compound umbel at the end of a long bare erect peduncle. *M. pilosa*, Labill., agrees with *M. serpyllifolia*, Br., the since published *M. perpusilla*, Hook. fil., and *M. diffusa*, described below, in its diffuse, much branched habit and short peduncles in the upper axils; but these four species differ too much in their leaves and calyx to be united into one. *M. montana*, Hook. fil., another new species, has also a similar habit, but the flowers appear terminal, and the capsule is of a very singular shape, something like that of the broad-fruited Veronicas, but with two styles at the external angles instead of one in the middle. *M. serpyllifolia*, Br., of which I have only seen small flowering specimens, is very much like *M. montana*, but comes from a very different locality, and I have not been able to ascertain the structure of its flowers. *M. alsinoides*, Br., is a little annual near *M. indica*, but with broader leaves chiefly in the lower part of the stem and longer slender peduncles. Some specimens gathered by Bidwill at Wide Bay appear to belong to a slight variety somewhat hairy in the lower part of the stem and leaves. The species described below as *M. lævis* differs in the shape of the corolla. *M. pygmæa*, Br., is very slender with the leaves all radical. It has all the appearance of the small specimens of *M. nudicaulis*, and may possible prove to be specifically identical, in which case Brown's name, as the oldest, should be adopted. *M. paludosa*, Br., is also near *alsinoides*, but is much branched with narrow leaves. *M. ramosa*, Br., and *laricifolia*, Br., are very distinct little annuals, with very narrow leaves and very small flowers, differing from each other chiefly in the shape of the corolla. *M. phascoides*, Br., is certainly the smallest of the genus; the whole plant in full flower is scarcely more than a quarter of an inch high.

The commonest of the Port Jackson species in our herbaria, distributed by Sieber as *M. prolifera*, n. 170, and published by Presl under the name of *M. hirsuta*, is the *M. polymorpha*, Br., a species varying much in hairiness, and running quite into the *M. canescens*, Br. Among the numerous specimens I have seen from various collections, there are some which might be equally well determined to be *M. squarrosa*, Br., *M. cinerascens*, Br., or *M. Sieberi*, DC., of none of which I have seen authentic specimens, but a careful examination of which would, I have little doubt, show the propriety of uniting all these supposed species into one.

8. POLYPREMUM, *Linn.*

This genus, referred by the elder DeCandolle to *Rubiaceæ*, by his son to *Loganiaceæ*, and by myself to *Scrophularineæ*, must accompany *Logania* and *Buddleia*, of which it has the æstivation and connected petioles. As a genus it differs from them essentially in the loculicidal dehiscence of the capsule, which only becomes at length septicidal by the splitting of the valves, instead of the two cells separating in the first instance. On this account *Polypremum* was associated by Alph. De Candolle with his *Spigelieæ*, and the æstivation supposed to be valvate. It proves, however, to be as strongly imbricate as in *Logania*. The habit of the plant is unlike that of any of the allied genera, and reminds rather of a *Minuartia*, or of some *Paronychieæ*. In this respect it also forms some approach to *Gilia* among *Polemoniaceæ*; and the tendency to a loculicidal dehiscence of the capsule, abnormal in *Loganiaceæ*, but characteristic in *Polemoniaceæ*, would add the latter to the number of families with which *Polypremum* might be associated, were it not for the quincuncially imbricate æstivation of the lobes of the corolla, which are, I believe, without exception contorted in *Polemoniaceæ*. The genus contains but a single species, for the *P. Schlechtendahlii* of Walpers appears to be merely an accidental form of the common one.

9. LOGANIA, *Br.*

I have already shown that the affinities of *Logania* are rather with the *Scrophularineæ* than with the *Rubiaceæ* or *Apocyneæ*. From *Gomphostigma*, hitherto placed in the former family, there is indeed little to distinguish it but the usually pentamerous, not tetramerous flowers, and even this character fails in the *Logania micrantha* mentioned below. The same circumstance also separates *Logania* from the other *Buddleieæ*, except that in *Buddleia* itself some species have often an admixture of pentamerous flowers. In these cases the toothed leaves, indumentum, and general habit are very different from those of *Logania*.

The species of *Logania* are now rather numerous. In addition to the twelve Australian ones, enumerated by DeCandolle, four from Swan River have been described by Nees, one from South Australia by Schlechtendahl, a very distinct one from subtropical Australia by Hooker, and a doubtful garden one by Kunth and Bouché. There are also one or two in our herbaria which appear to be undescribed, but, without more numerous specimens in all states of some of the commoner species, it is very difficult as yet to make out a good monograph. Some species are evidently very variable. There appears to be a regular gradation among the Eastern ones, from *L. floribunda* to *L. angustifolia*, *L. revoluta*, and *L. linifolia*; so also between *L. latifolia*, *L. longifolia*, and their allies in South-western Australia. The distinction of the species allied to *L. campanulata*, Br., from the same part of the country, is likewise involved in much obscurity.

One species from the same district again which I have ventured to describe as new, under the name of *L. micrantha*, is very remarkable from the ovules as well as the seeds being solitary in each cell, which would technically exclude the plant not only from the genus, but from the tribe, and place it in a new one to correspond in *Loganiaceæ* with *Spermacoceæ* among *Rubiaceæ*. But I should regard it as rather a specific anomaly in *Logania*, similar to what we observe in *Hedyotis monosperma*, W. & Arn., where the ovules are likewise solitary. For the great development of the placenta and the position of the seed seem to point to the abortion of other ovules, which the observation of the ovary in a living state at a very early period of growth might probably enable us to detect.

Dr. Hooker has described a species from New Zealand, so far extending the limits of the genus beyond Australia itself. On the other hand, it is probable that there is some mistake in the supposed South African species described by Ecklon. No one appears to have since seen it, although the Uitenhage flora is now pretty well known; nor have Ecklon's specimens been re-examined by any competent botanist.

10. GOMPHOSTIGMA, *Turcz.* 11. NUXIA, *Lam.*—and 12. CHILIANTHUS, *Burch.*

I have nothing to add to the distinctive characters of these three genera as given in the tenth volume of the 'Prodromus,' nor have any new species been added either to *Gomphostigma* or *Chilianthus*. Sonder has in the twenty-third volume of the 'Linnæa' described three South African *Nuxias* as new. His *N. pubescens*, which we have from Burke and Zeyher, is a well-marked one, of which *N. tomentosa* appears, as suspected by Sonder, to be a mere variety. The third, *N. emarginata*, is unknown to me.

13. BUDDLEIA, *Linn.*

In this genus we have the addition of Dr. Hooker's beautiful and splendidly illustrated *B. Colvillei* from the Himalaya, two Bolivian species described by Remy, and both unknown to me, and no less than thirteen supposed new species from Mexico,—three published by Martens from Galeotti's dried collection, and ten by Kunth and Bouché, from specimens cultivated in the Berlin garden.

Of the former, *B. pseudoverticillata*, Mart. & Gal., is a not uncommon state of *B. sessiliflora*, H. B. K.; *B. obtusifolia* is identical with *B. microphylla*, H. B. K.; the third, *B. elliptica*, is unknown to me. The ten published by Kunth appear to be chiefly slight varieties of some of the common Mexican species, but, for want of a critical comparison with wild specimens of these very variable plants, it is impossible to form any plausible opinion respecting them, and they must remain as so many puzzles until authentic specimens shall have been examined by some one well acquainted with the genus in general.

On the other hand, two Madagascar plants retained as Buddleias in the 'Prodromus,' *B. diversifolia* of Vahl and my own *B. rondeletiæflora*, must be removed, as forming Tenore's genus *Nicodemia*. With precisely the flowers and ovary of *Buddleia* they bear, instead of a capsule, an indehiscent berry, not perhaps so fleshy as in most of the *Fagræeæ*, but white, and filled with a juicy pulp in which the seeds are immersed. This increases much the difficulties of classification; for by adhering to the tribual characters, these plants must be classed amongst *Fagræeæ*, although in everything but the fruit they are so perfectly Buddleias, that it seems very unnatural to remove them so far from that genus. Many such unnatural separations are, however, absolutely unavoidable in all classifications of *Rubiaceæ* hitherto proposed.

In Griffith's posthumous 'Icones,' t. 422, the *Teucrium macrostachyum*, Wall., is figured as a *Buddleia*, a name probably provisionally given to the plant without examination in the hurry of a mountain excursion, and never intended to be retained. The unrevised publication of all these fugitive memoranda is much to be regretted, as tending to do irreparable and most undeserved injury to the reputation of so eminent a botanist, with those who are unacquainted with the circumstances of the case.

14. GENIOSTOMA, *Forst.*

This genus has the stipules and habit of some *Rubiaceæ*, but the ovary is superior, although attached by a very broad fleshy base. The corolla has the contorted æstivation of the *Apocyneæ*, and the fruit is not so unlike as has been generally supposed. The two thick concave valves cohering at the base and curved outwards, each crowned by one of the styles, which, though also long cohering, ultimately separate, are very much like two follicles. The placentæ generally form one central column, but in some species they separate and turn back with the valves. *Genio-*

stoma is therefore more exactly intermediate between *Rubiaceæ* and *Apocyneæ* than any other known genus.

The corolla is usually described as "subinfundibuliformis, fauce barbatâ." The tube is, however, so short that it is often almost rotate, and the hairs, when they exist, are rather on the upper surface of the lobes than in the throat.

Of the species enumerated by DeCandolle six are from the Mauritius, but of these the *G. parviflorum* does not appear to differ from *G. pedunculatum*, and *G. lanceolatum* is probably a mere variety of the common *G. ovatum* which varies much in the shape of the leaf. On the other hand, some specimens transmitted by Bojer under the name of *G. obovatum* belong to a really distinct species with larger flowers, anthers terminated by a long linear appendage, and pods more than twice the length of those of the other species.

From the five Polynesian species must be deducted *G. acuminatum*, Wall., described from male specimens of a species of *Urophyllum* (*Axanthes*, Bl.) allied to *U. glabrum*; and *G. hæmospermum* does not appear to me specifically to differ from Forster's original *G. rupestre*, of which I have seen the specimen in the British Museum, and which I have also from the Feejee Islands, gathered by the American Exploring Expedition. It is well described by Blume, and, besides the varieties alluded to by him, the branches often become glabrous. I have three new species to add: one from the Philippine Islands with the leaves of *G. ligustrifolium*, but differently shaped calyxes, a thick-leaved sea-coast one from the Isle of Pines off New Caledonia, and a very large-leaved one from Bonin.

Tribe III. FAGRÆEÆ.

This tribe corresponds with *Gardenieæ*, characterized by an indehiscent fleshy fruit with several ovules in each cell of the ovarium. The affinities, however, with *Rubiaceæ*, except in the case of *Fagræa* itself, are not so close as in the case of the other tribes. *Strychnos* is in the tribe the representative of *Apocyneæ*, and *Nicodemia* of *Scrophularineæ*, but in both instances the connexion is rather remote; nor are all these genera very naturally associated with each other, but I have been unable to discover any better arrangement. Like the other tribes, it may be divided according to the æstivation of the corolla; contorted in the Asiatic *Fagræa*, the American *Desfontainea* and *Potalia*, and the African

Anthocleista; valvate in *Strychnos*, a genus spread over the whole of the tropics, *Brehmia*, peculiar to Africa, and possibly also in *Labordea* from the Sandwich Islands, and imbricate in the Mascarene *Nicodemia*.

15. DESFONTAINEA, *Ruiz et Pav.*

This plant, for the genus consists but of a single species, although repeatedly described and figured, has given rise to much difference of opinion as to its affinities, and even to considerable uncertainty as to the real structure of its ovary. Referred by some from its foliage to *Ilicineæ* or *Theophrasteæ*, by others from its fruit to *Solaneæ*, from its bitter principle to *Gentianeæ*, from some supposed affinities quite unintelligible to me, to the vicinity of *Diapensia* and *Galax*, it is only recently that its real place among *Loganiaceæ* has been pointed out in the 'Gardener's Chronicle,' although even there an affinity is also suggested with *Legnotideæ*, whose connexion with *Loganiaceæ* I have already said I am unable to comprehend. I have now been enabled to clear up all doubts as to the structure of the flower; the rich materials at Kew, where the Hookerian herbarium alone contains specimens from seventeen different collections, have given me the means of examining several ovaries taken from the most different-looking forms, and all confirm the association of *Desfontainea* with *Loganiaceæ*, showing the closest affinity with *Fagræa*, and like *Fagræa* forming a connecting link between *Loganiaceæ* and *Gentianeæ*. Indeed, besides the dentate leaves and the colour of the flowers, almost the sole generic distinction between *Desfontainea* and *Fagræa* consists in the number of cells of the ovary, which in the former are usually five, although sometimes reduced to four or even three, whilst in *Fagræa* they are always two only. The raised line connecting the petioles, the five-leaved calyx, the æstivation of the corolla, the form and position of the stamens as well as the structure of the gynœcium (always excepting its number of parts), are the same in both. In both genera, although the ovary is completely divided into cells at its base, the dissepiments show an occasional tendency to separate from each other in the upper part. In some species of *Fagræa*, as I have already observed, they do not even meet in the centre; in *Desfontainea* I have always found them to meet, but they are often very easily separable, and if the ovary under examination has not been thoroughly soaked, they appear on a transverse section to leave a vacuity in the centre. This has probably been the cause of the ovary having been described by Don as unilocular with parietal placentæ, contrary to the more accurate characters given by Ruiz and Pavon, and by Bonpland.

The geographical range of the species is extensive,—along the whole length of the Andes of South America, from New Grenada to the Straits of Magellan; and, as might be expected, there are considerable variations in the foliage, although much less than in some of our own shrubs, such, for instance, as our common Holly. The connecting line of the petioles often shows on each side two minute teeth or protuberances, from whence two prominent lines are more or less decurrent along the young branches, disappearing entirely on the older ones. In the small-leaved specimens gathered at great elevations within or near the tropics these lines are particularly prominent, and characterize the *D. acutangula* of Dunal. The southern specimens have usually a luxuriant foliage and broader and more ciliate lobes to the calyx, constituting the *D. Hookeri*, Dun. Specimens similar to these, but with unusually large leaves and more numerous teeth, were originally selected by Ruiz and Pavon to figure as their *D. spinosa*; and when Bonpland had only before him the commoner Columbian form with few large teeth to the leaves and narrow scarcely ciliate lobes to the calyx, he did not venture to identify them as the species figured in the 'Flora Peruviana,' and therefore published them as a distinct one under the name of *D. splendens*. But all these trifling differences are so variously combined in the numerous specimens before me, that I cannot but regard them as mere variations of one species which will retain the older name of *D. spinosa*.

16. FAGRÆA, *Thunb.*

Fagræas may be almost characterized as *Gardenias* with a free ovary. The habit and flowers are very similar; there is in both an occasional tendency to an increase in the number of lobes of the corolla and consequently of the stamens; some few species of *Fagræa* have even the peculiar exceptional character of *Gardenia*, an incompletely divided ovary, the parietal placentæ not reaching quite to the centre. But in *Fagræa* the ovary is completely free, and the stipules are reduced to mere auricular expansions of the base of the petiole, like those of some East Indian *Tabernæmontanas*. In other respects *Fagræa* has less in common with *Apocyneæ* than several other Loganiaceous genera, but it forms in the whole family the nearest real approach to *Gentianeæ*. Comparing it with some species of *Lisyanthus*, the chief ordinal distinction consists in the greater development of the placentæ and fleshy fruit, and the habit is by no means dissimilar.

The known species of *Fagræa* are all Asiatic or Polynesian. They are all thick-leaved trees or shrubs with a more or less tendency to pseudo-parasitism, or to a somewhat climbing habit; the inflorescences and flowers are apt to be thick and succulent, so as to be difficult to dry; many of the species run much one into another, and herbaria specimens are very unsatisfactory for distinguishing them. That an erect or climbing habit is not in this case a good specific difference, we have not only the presumption derived from the inspection of specimens, but the positive evidence of the late Col. Champion, a most careful observer, who found both the common Ceylonese species to vary as stunted shrubs, weak trees, or woody climbers, or perhaps rather trees with sarmentose branches. Blume, who has with perfect justice included *Cyrtophyllum* and *Picrophlœus*, enumerates thirty-three species, besides seven others contained in DeCandolle's Prodromus, the *F. coromandeliana* since published by Wight, and three new ones which I now propose. But it is probable that several of the above will have to be reduced when better known. Some are described from specimens in leaf only, others in fruit without flowers, or from manuscript descriptions and figures, and there appears reason to believe that the characters derived from the leaves are not more constant in this than in other genera.

The division proposed by Blume into three groups according to the inflorescence is a very good one. The first, with few-flowered terminal cymes or corymbs and large flowers, contains the greatest number of species. These may be subdivided, or rather arranged, according to the length of the tube of the corolla before it expands into a campanulate throat. In *F. carnosa*, Jack, of which we have specimens from Moulmeyn, gathered by Lobb, it is near 5 inches long; *F. tubulosa*, Blume, is said to be very near that one; *F. zeylanica* of Thunberg, very well figured by him in the 'Stockholm Transactions,' and by Blume in the 'Rumphia,' although often confounded by others with a short-flowered species, has the tube full 3 inches long. In the *Carissa grandis* of Bertero, from the Society Islands, which is an unpublished *Fagræa*, and in *F. lanceolata*, Blume, the tube is shorter, but still it does not expand till above the middle; so it is also in *F. lanceolata*, Wall., a Penang plant with smaller flowers, which DeCandolle had on that account placed in *Cyrtophyllum*, but which has them still near twice as long as in *F. fragrans*, while the inflorescence is that of Blume's first group.

All the remaining species of this first group, as far as they are known to me, have the tube of the corolla expanded from below the middle. Of these, *F. auricularia*, Jack, a common Molucca species, and *F. plumeriæflora*, A. DC., from the Philippines, are not easily mistaken; but we have next a set of East Indian ones which present the greatest difficulty in defining. *F. obovata*, Wall., from Khasiya, is well figured in the 'Botanical Magazine,' t. 4205. *F. coromandeliana*, Wight, Ic. t. 1316, of which I have seen but a single very poor specimen, is very like it in the flowers, but the petioles of the leaves are very short. *F. crassifolia*, Bl., gathered in Malacca by Griffith, has the leaves and calyx of *F. obovata*, but only one or three sessile flowers and apparently a shorter tube to the corolla. *F. globosa*, Wall., from Tavoy, only known in fruit, is perhaps identical with the last. *F. malabarica* of Wight or of Blume, for both have given it that name with reference to Rheede's figure of *Modagam*, vol. iv. t. 58, has again the foliage of *F. obovata*, and some specimens from the Calcutta Garden have been so named in some herbaria, and figured as such in Griffith's Icones; but the flowers are rather smaller and more slender, the calyx shorter, and the inflorescence often, but not always, looser. Specimens from Ceylon again, gathered by Champion, have the short calyx and the corolla of *F. malabarica*, but with the short petioles of *F. coromandeliana*, and Blume's *F. obovato-javana* from Java appears intermediate between several of these, so that it is not improbable that the whole of these may ultimately prove to be varieties of *F. obovata*. All appear to have a globular or somewhat ovoid fruit at least an inch in dianeter.

The Khasiya collections contain another species, near to *F. obovata* in foliage, but with a more lax inflorescence, smaller flowers, and especially a much smaller ovate-oblong fruit. In this the ovary is bilocular only at the base. In the upper part the parietal placentæ do not meet.

The only two remaining species of this group of which I have seen specimens, are one gathered by Lowe in Borneo, which, from the form of its leaves and flowers, may be the *F. minor* of Blume, and one from the Feejee collection of the American Exploring Expedition, which may be new, but which I am afraid to characterize without comparison with some of Blume's evidently allied to it.

In the second group, or so-called *Racemosæ*, the short few-flowered cymes are arranged in opposite pairs along a common peduncle, so as to form a kind of compound raceme. The typical species are, *F. volubilis*, Wall., *F. racemosa*, Jack, and *F. morindæfolia*, Blume, which constitute probably but one species spreading all over the Moluccas. We have Jack's own authority that the *F. volubilis* (of which he had sent the specimens to Wallich) is the same species as his *racemosa*, and some specimens of the latter can by no means be distinguished from the smaller ones of *F. morindæfolia*. Both have precisely the same foliage; and if in *F. volubilis*, besides the compact inflorescence, the leaves are more acuminate and more contracted at the base than is usually the case with *F. racemosa*, still there are specimens of that and of *F. morindæfolia* which have a similar tendency.

Blume has seven other species of this group, of none of which we have any specimens; but we have two well-marked ones, perhaps both new; one is from Mr. Motley's Borneo collection, and must be near *F. coarctata*, Blume, but with flowers very much larger and differently shaped from those of *F. morindæfolia*, with which those of *F. coarctata* are compared; the other, as it were, a miniature representation of *F. racemosa*, gathered in Singapore by Mr. Lobb, which may be a form of *F. ligustrina*, Bl., with three flowers instead of one or two to each of the cymes forming the raceme.

Of the third group with small flowers in supradecompound corymbs our herbaria possess two species. One is *F. fragrans*, Roxb., introduced into the Moluccas from China, with which *F. peregrina*, Blume, appears identical. The other is *F. speciosa*, Blume, from Java, which is most likely to be the true *F. elliptica*, Roxb., only known by his very short and incomplete diagnoses. The *F. kimangu* and *F. picrophlœa* referred to this section by Blume are entirely unknown to me; the author himself has only seen the foliage of one and the foliage and fruit of the other.

A Penang plant occurs in some herbaria distributed from the Horticultural Society's collections under the name of a *Fagræa*, of which it has the stipular expansions of the petiole. Can this be the one shortly described by Martius as *Fagræa malayana*? If so, that species must be rejected from the genus, as upon a careful examination it proves to be merely a few-flowered form of *Tabernæmontana corymbosa*, Roxb.

17. POTALIA, *Aubl.*

This genus is very well characterized by the great number (usually ten) of the lobes of the corolla and of the stamens, whilst that of the lobes of the calyx is four only. But all the other characters are too near to those of *Fagræa* to justify its removal into another tribe, more especially as, according to Blume, *Fagræa* itself has occasionally six or seven lobes to the corolla.

There appears to be but one species of *Potalia* known from tropical America; at least I can find no difference between Martin's Cayenne specimens, which are evidently Aublet's *P. amara*, and Spruce's Rio Negro ones, corresponding with Martius' *P. resinifera*. Both are low weak shrubs (1 to 3 feet high according to Aublet, about 4 feet high according to Spruce), of which the short flowering branches are said to wither and fall off with the inflorescences, as is the case with a great number of other shrubs and even trees. The plant figured in Griffith's 'Icones Plantarum Asiaticarum,' t. 383. fig. 1, as a *Potalia*, appears to be a species of *Ehretia* allied to *E. longiflora*, Champ.

18. ANTHOCLEISTA, *Afz.*

The great difference between this African genus and *Potalia* consists in the greater development and singular arrangement of the placentæ, well figured in Hooker's Icones, t. 793, 794 (Niger Flora, t. 43, 44). They appear to be two parietal placentæ twice bifid and connected together by a spurious dissepiment dividing the ovary into two cells, thus giving the appearance of two pairs of opposite bifid placentæ placed at some distance from each other on the dissepiment, whilst in *Potalia* there are but two bifid placentæ in the centre of the dissepiment. This difference is, however, not greater than those observable in the placentation of different species of *Fagræa*, and had the genus *Anthocleista* not been already established, I should certainly have considered it as a second species of *Potalia*.

On a further examination, I see no reason to alter the opinion I had already expressed in Hooker's 'Niger Flora,' that the three supposed species of *Anthocleista*, *A. nobilis* and *macrophylla* of Don, and *A. Vogelii* of Planchon, are in fact but one, the distinctive characters given being liable to variation even in the same specimen.

19. STRYCHNOS, *Linn.*

The genus *Strychnos* appears to have no very exact parallel in either of the allied families *Rubiaceæ* or *Apocyneæ*. In the former, the combination of a succulent indehiscent many-seeded fruit with a valvate æstivation of the corolla is rare, and occurs chiefly among the genera with more than two cells in the ovary, usually classed among *Isertieæ* and *Hamelieæ*. In *Apocyneæ* we have a somewhat similar fruit in *Melodinus*. In external appearance those of the common species of both genera are described as exactly like oranges, and the strong poisonous properties of *Strychnos* occur also in several Apocyneous genera; but the æstivation of the corolla forms a decided separation, confirmed by the peculiar foliage, and *Strychnos* (including *Brehmia*) stands more isolated than almost any other Loganiaceous genus.

The species more or less known, both in the new and the old world, are now numerous. Unfortunately the great similarity of their foliage, the impossibility of preserving their ripe fruits in herbaria, and the difficulty of obtaining even good flowering specimens of large woody climbers, render the discrimination and identification of many of them a difficult task. The arboreous or climbing habit, which has been adopted as one of the first principles of division, is very difficult to judge of from dried specimens. The presence or absence of the peculiar hooked tendrils of the genus is by no means a safe criterion. They are sometimes so few in some of the most climbing species that herbarium specimens are mostly without them, whilst, on the other hand, some of the smaller American kinds are described by all collectors as erect shrubs, although the specimens bear several cirrhi. There is reason indeed to believe, that some species which are erect and bushy in open situations become more or less scandent when growing in moist woods or thickets. A much more marked distinction lies in the shape of the corolla. The tube is sometimes so short as to make it almost rotate, sometimes four or five times the length of the laciniæ; in some species it is slender and equal to the top, in others it is gradually enlarged. The hairs of the laciniæ occupy either nearly the whole inner surface, or the base only, or form a ring round the throat or a curved line across the middle of the lobe, or again are wanting altogether. But all these distinctions pass so gradually one into the other, that, however different for instance may be the flowers of *S. nux-vomica* from those of *S. rubiginosa*, no good sectional line can be drawn between them. The number of parts of the flower, quaternary or quinary, is barely of specific value; it has no relation to habit, and both numbers are occasionally to be found on the same species, although it may often occur in two species otherwise very nearly allied that the one or the other may be the prevailing number. I have therefore been unable to retain even as a section the genus *Rouhamon*, adopted with some hesitation by Alph. DeCandolle; and if *Brehmia* may yet be maintained as distinct, it is not on account of its supposed tetramerous flowers, for I find almost as often five as four parts; but because a combination of minor characters gives to the flower so different an appearance, that I have been unwilling to suppress it so long as no second species is discovered to connect it more closely with other *Strychni*. There are also among *Strychni* considerable differences in inflorescence, yet seldom in sufficient accord with other characters to make good sections. I have therefore, in the subjoined enumeration of species, thought it most convenient to commence by separating those of the old world from the American ones; in the former case to adopt DeCandolle's division into arborescent and climbing species, and to arrange these as nearly as possible according to the form of the corolla. Among the American species, inflorescence combined with the form of the corolla appears to afford the best primary characters.

The Asiatic species present some difficulty in the identification of those already published. The *S. nux-vomica*, a common tree on the Indian coasts, is indeed easily recognized, not only by its arborescent stem and corymbose inflorescence, but essentially by the long tube and naked throat of the corolla. It has, however, frequently been confounded with *S. colubrina*, a scandent short-flowered species, and several of the figures usually quoted do not help to clear up the confusion. Rheede's *Caniram*, vol. i. t. 37, represents the leaves as alternate, although he describes them as opposite, and the flowers are very rudely drawn. Wight's plate 434 of his 'Icones' is a very good representation of the foliage and flowers of a luxuriant specimen; but there is a tendril represented on the stem, and the figure is therefore referred to *S. colubrina*, though quoted by DeCandolle under *S. nux-vomica*. The drawing was one of Roxburgh's, and it is impossible now to say whether the tendril was an error of the artist having mixed up specimens of two species, or whether in the individual represented a tendril had been accidentally formed, as occurs occasionally in some of the erect American species, or whether again it was really a somewhat anomalous specimen of one of the long-flowered scandent species, such as *S. ovalifolia*. Roxburgh's own plate 4 of his Coromandel plants is an excellent representation of *S. nux-vomica*.

Blume's figure and description of his *S. ligustrina* (Rumphia,

t. 25) do not in any respect differ from a stunted state of *S. nux-vomica,* which, according to Dr. Wight, is not uncommon about Madras. All writers describe the leaves and fruit of *S. nux-vomica* as very variable in size. DeCandolle says, indeed, that the colour of the fruit of *S. nux-vomica* is of a brown-red, and that of *S. ligustrina* of a yellow-green; but we learn from Roxburgh and Rheede, as well as from verbal communications of those who are familiar with the tree, that the fruit of *S. nux-vomica,* at first of a yellow-green, assumes at length a rich orange-yellow. The figure of Rumphius, vol. ii. t. 38, quoted for the *S. ligustrina,* evidently represents some totally different plant. It is without flowers, and has neither the foliage nor the fruit of a *Strychnos.*

S. colubrina is generally supposed to be a scandent *nux-vomica* with simple tendrils, and is consequently placed among the long-flowered species by DeCandolle. The original must be taken to be Rheede's *Modira Caniram* from Malabar, vol. viii. t. 24, which has not been identified by subsequent writers; for the only Malabar species like it which is known has been universally distinguished under Leschenault's name of *S. bicirrhosa,* as having the tendrils forked instead of simple as figured by Rheede. I find them, in such specimens as our herbaria afford, almost universally forked, but I have also met with simple ones even on the same specimen. The *S. bicirrhosa* has a very short tube to the corolla, but so also may *S. colubrina* for anything in Rheede's figure or description to the contrary, and I feel little doubt in my own mind of the identity of these two species.

Linnæus, in quoting Rheede's *Modira Caniram,* refers by mistake to another plate of the 'Hortus Malabaricus,' vol. vii. t. 5, which represents his *Tsjeri Katu Valli Caniram,* a smaller species from the islands off the coast, which Rheede clearly distinguishes. Blume has identified this with a not uncommon Cingalese species which he has described under the name of *S. minor,* and which, besides minor differences, appears to have the flowers almost universally tetramerous instead of pentamerous.

Wallich has described under the name of *S. colubrina* a Silhet species which I am unable to identify, there being no specimens of it in his collections, and none answering to his description in either Griffith's, Hooker and Thomson's, or any other of our Khasiya collections. It must be very near to the true Malabar species; Wallich does not indeed particularly describe the corolla, but says generally that the flowers are small. A Malacca plant in Griffith's collection agrees, however, still better with Wallich's detailed description. It has appeared to me to be a good species, which I have described under the name of *S. malaccensis*. Possibly this and Wallich's latter plant may ultimately prove to be mere varieties of the true *colubrina*, but, I repeat it, the specimens I have seen in the several herbaria at Kew, London, or Paris, are wholly insufficient to afford any satisfactory evidence of the real value of the characters assigned by myself or others to the *S. colubrina*, *bicirrhosa*, *minor*, and *malaccensis* respectively.

S. ovalifolia, Wall., and *S. Wallichiana*, Steud. (*S. lucida*, Wall., not of Brown), are both long-flowered climbers, differing slightly from each other in foliage, but more decidedly in the corolla, hairy at the base of the limb in one, naked in the other. Of *S. acuminata*, Wall., published as distinct, neither flowers nor fruit are known, and there is nothing in its foliage to separate it from *S. ovalifolia*.

S. Tieute, Blume, from Timor and other islands between that and Java, and *S. lucida*, Br., from tropical Australia, are both unknown to me.

S. grandis, Wall. Cat. n. 4454, from Penang, referred to *Strychnos* in the haste of a first sorting, on account of its ribbed leaves, must be at once rejected as having them alternate. It is the same plant as the *Cocculus flavicans*, Wall. Cat. n. 4976; and, as mentioned in Hooker and Thomson's 'Flora Indica,' belongs to *Anisophyllum*, Don, or *Tetracrypta*, Gardn., a curious genus referred by Gardner to *Hamamelideæ*, and in the 'Niger Flora' to *Legnotideæ*, in which this plant constitutes a new and very distinct species*.

Strychnos, n. 5500 of Wallich's Catalogue, is a very bad specimen, in fruit only, with alternate pinnately-veined leaves, and therefore no *Strychnos*. It affords no materials to determine what it may really be.

S. oblongifolia, Hochst., mentioned in the 'Prodromus' as a doubtful species, has been since referred by its author to *Carissa*.

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* *Anisophyllum grande*, sp. n., foliis amplis quintuplinerviis oblongo-ellipticis glabris, pedunculis crassis ramosis floribusque tomentellis.—Rami adulti glabri. Folia 8–10 poll. longa, 3–4 poll. lata, acuminata, basi obtusa, siccitate flavicantia, petiolo crasso 3 lin. longo. Inflorescentia supra-axillaris; pedunculi sæpe plures suprapositi inæquales, longiores 3–4-pollicares, parum ramosi, tomento minuto rufescentes. Flores sessiles. Unicum examinavi ovario jam paullulum aucto ovoideo 2 lin. longo. Calycis laciniæ 4, brevissimæ, latæ, obtusæ. Petala jam delapsa non vidi. Stamina perpauca superfuerunt parva, antherâ biloculari, filamento brevi. Styli 4, divaricati, subulati, basi incrassati et pubescentes, disco crassiusculo insidentes. Ovarium inferum, quadriloculare, ovulis in quoque loculo solitariis pendulis.

S. Unguacha, A. Rich., from Abyssinia, extending, if I mistake not, across to Senegambia, an unpublished species gathered by Forbes at Delagoa Bay, and *S. Lokna*, A. Rich., unknown to me, but from his description intermediate between the two, are African arborescent species, corresponding in habit, inflorescence and flowers with the well-known East Indian *S. potatorum*.

S. scandens of Schumacher and Thonning, from West tropical Africa, can, from the descriptions given, scarcely belong to the genus. The leaves, if I understand them rightly, are penninerved, the stamens inserted near the base of the corolla, the lobes of the corolla elongated and slightly contorted, and the fruit a "bacca capsularis;" all which would rather indicate some Apocyneous plant allied to *Vahea*. Vogel's collection from the Niger does indeed comprise a scandent cirrhiferous *Strychnos*, but it is evidently not Thonning's plant. It is in fruit only, and without the flower cannot be distinguished from several of the Indian ones.

The St. Ignatius's bean, a Philippine Island seed, whose medical properties have been so highly extolled by Loureiro and other older writers on Indian botany, as well as by Blanco among modern ones, has been described and figured by Gaertner and others, showing all the characters of a *Strychnos*. The plant which furnishes them is unknown to all modern botanists. The younger Linnæus alone professes to have been acquainted with it, and has characterized it as a distinct genus, under the name of *Ignatia*. He does not tell us where he procured the specimens from, but says generally, "Hab. in Indiâ." The species does not, however, appear to have been ever cultivated in India, where the seed alone is imported. Roxburgh does not mention it: Loureiro introduces it into his flora as an imported seed, taking the characters of the flower from Linnæus. Even Blanco in the Philippine Islands could never procure more than a dried specimen, an "arbolito" of a man's height, in leaf only, without flowers, although he says it is common in the Bisayas provinces of the islands. He vainly endeavoured to cause the seeds to germinate; they all rotted in the ground, although, hearing from an old woman that they would grow if steeped in vinegar, he tried that and other means of exciting them. Turning to Sir James Smith's herbarium, where the younger Linnæus's plants are generally preserved, I find in the cover of *Ignatia* two good specimens of *Posoqueria longiflora*, one from Guiana, from the Banksian herbarium, the other without any reference to its origin, which agree in most respects with the published description of *Ignatia*; and in a small capsule marked "Flos Ignatiæ, an amaræ? ex Herb. Linn. fil. inter plantas Aubletii," is a detached flower of the same plant. From these data we are forced to conclude, that Linnæus the younger's character of *Ignatia* is taken from the flowers and foliage of a Guiana *Posoqueria*, and the seed only of the true Philippine Island plant, and the genus must therefore be suppressed as fictitious. The St. Ignatius's bean is most probably the seed of a true *Strychnos*, the identification of which must be reserved for future travellers. There is, indeed, one species, described below under the name of *S. multiflora*, which must be abundant in the Philippines, as it occurs under four different numbers of Cuming's collection, and whose foliage answers to Blanco's description; but we have it in flower only, and we have no means of ascertaining whether it be or not the one that produces the bean.

I may here allude to another plant, which, on account of its opposite ribbed leaves, occurs in some herbaria under *Strychnos*. This is a tall, large-leaved climber, having a wide range, from the foot of the Sikkim Himalaya, Khasiya, and Chittagong to Penang and the Moluccas, and has been published by Wallich and DeCandolle in *Jasmineæ* under the name of *Chondrospernum smilacifolium*, and by Blume in *Oleineæ* under that of *Myxopyrum nervosum*. With the habit and flower and exact ovules of the one, and the albuminous seeds of the other, it suggests the propriety of reuniting the *Jasmineæ* and *Oleineæ* as tribes of one family, as established by the elder Jussieu.

The American *Strychni* show the same variations as the Asiatic ones in the length and number of parts of the flower; and, as I have already observed, there remains no character whatever to distinguish *Rouhamon*, for the fruit in all is baccate and indehiscent, although smaller and drier in some species than in others. The division into erect and scandent species is fully as difficult as in the case of the Indian ones, as the dried specimens seldom afford any evidence one way or the other. From collectors' notes it appears that *S. pseudochina* and *triplinervia* are the only two, among the long-flowered ones, which are real trees. *S. Gardneri*, described as such in the 'Prodromus,' is, according to Gardner's label, a tall climber, and some of his specimens have cirrhi. It is a species closely allied to three or four others from various parts of tropical America, which our specimens scarcely afford materials for distinguishing properly; and I am by no means confident that I have ascribed correct limits to them. So among the small-flowered ones, some species with cirrhi are nevertheless distinctly described by their collectors as erect twiggy shrubs, and the production of straight spines, as well as of these hooked cirrhi, appears to vary according to situation. I feel persuaded that, however different Blanchet's specimens of *S. parvifolia*, A. DC., may at first sight look from Sello's of *S. brasiliensis*, Mart., they are but forms of one species, which Spruce also found in abundance on the Amazon; the pubescence, the breadth of the leaves, the greater or less prominence of the nerves, vary exceedingly even on the same tree, and specimens with or without thorns and cirrhi differ in no other respect. The stature is generally described as a shrub, or small twiggy tree, of about 15 feet.

The most important of the American species, such as *S. pseudochina*, St. Hil., *S. toxifera*, Schomb., *S. Rouhamon*, &c., may now be considered as pretty well known; but there are others, said to be much used, of which we have only very vague information and imperfect specimens; such are *S. cogens*, Schomb., and *S. curare*, H. B. K. Much as Schomburgk and Spruce have contributed to the enlargement of this genus, there are still several of their species of which we have not yet seen the flowers; and of the western ones I have only found a flowerless specimen of *S. Darienensis*, Seem., in the Hookerian herbarium, and none at all of *S. Panamensis*, Seem., or of *S. brachiata*, R. et Pav. Very much therefore remains to be done before a good classification of the genus can be substituted for the artificial arrangement I now propose.

20. BREHMIA, *Harv.*

I have already alluded to the close connexion of this genus (or rather species, for there is but one) with *Strychnos*, with which it will probably one day be reunited. It is a Madagascar shrub, widely spread also over South-east Africa. A specimen of Heudelot's, from Senegambia, is more luxuriant, has no spines, larger leaves, and more flowers; but these flowers are in every respect so precisely similar to those of *B. spinosa*, that I have no hesitation in considering the whole as one species, thus stretching, in common with so many other plants, entirely across the African continent.

21. LABORDEA, *Gaud.*

This genus is only known from Gaudichaud's figure and imperfect description in the Botany of Freycinet's Voyage. It is evidently a very distinct plant. The æstivation of the corolla is not described, but it would appear from the figure to be valvate. The fruit is unknown. Gaudichaud doubts whether it be capsular, as was then supposed to be generally the case in *Loganiaceæ*, and it is clear from the figure that the ovary and placentæ are thick and fleshy. It would therefore rank artificially next to *Strychnos*, with the stipular dilatations of *Fagræa*, a peculiar calyx, and three cells to the ovary; the only instance except *Desfontainea* as yet known in the Order.

Since this paper was drawn up, during a hurried visit to Paris, I saw the original specimen in the herbarium of the Jardin des Plantes. It had much the look of a *Gærtnera*, but the inflorescence was so young, that it was impossible to derive from it any further information as to the structure of the flowers.

22. NICODEMIA, *Ten.*

As already mentioned, *Nicodemias* are *Buddleias* with an indehiscent baccate fruit. The plant was long known as a *Buddleia*, and the fruit was probably originally observed by DeCandolle, who, in the 4th vol. of the 'Prodromus,' excludes Sieber's specimens from *Rubiaceæ*, where that collector had placed them, and refers them with doubt to *Solanaceæ*. Tenore was the first who fully identified the fruit and flowers, and established the genus; but as he published it in a country having but little scientific intercourse with the rest of Europe, his *Nicodemia* had been long overlooked; and when preparing *Buddleia* for the 'Prodromus,' I had nothing to lead me to exclude the *B. diversifolia*. I have since, however, received excellent specimens from Tenore, besides seeing the plant in fruit myself in the Botanical Garden at Naples, and have now the opportunity of doing full justice to the Professor's investigations. In describing a second Madagascar species, I myself saw reason to believe that the ovary was fleshy, but had no specimens at all far advanced enough to decide the point.

Tribe IV. GÆRTNEREÆ.

The *Gærtnereæ*, or *Coffeaceæ* with a free ovary, consist of three genera, more intimately connected with the corresponding *Rubiaceæ* than almost any other *Loganiaceæ*, although they represent but very few of the modifications observable in the extensive tribe of *Coffeaceæ*. We have only the valvate corolla of *Psychotria*, not the contorted æstivation of *Ixora*; we have no instance of more than two cells to the ovary; and of the three most important modes of insertion of the ovule, pendulous in *Canthieæ*, erect in *Psychotrieæ*, and laterally peltate in *Ixoreæ*, we have in *Gærtnereæ* only the two last.

The connexion with the allied free *Monopetalæ* is very slight. *Pagamea* and *Gærtnera* are Rubiaceous even in their stipules. *Gardnera* may indeed show some approach to *Apocyneæ* in its anthers and less prominent stipules, but not in any other particular.

23. Gardneria, *Wall.*

The ovary in this genus is at the time of flowering so small and fleshy, and the cavities so very minute, that it has always been found very difficult to ascertain its structure. It has generally been supposed to have two cells, with one ovule in each; but this is doubted by DeCandolle. Zuccarini describes one pendulous ovule in each cell, and the berry is certainly usually two-seeded. But four-seeded berries are occasionally to be met with in one species, and Wight represents more than one ovule in each cell of the other. I have therefore been led to examine very carefully the ovaria of a considerable number of specimens; and although at first I had some difficulty in tracing them in the *G. ovata*, I subsequently found them in several flowers, but always solitary and exceedingly minute. In the *G. angustifolia* they appeared more distinct, and always two in each cell, collaterally attached by their centre. I found the same structure also in one of Siebold's Japanese specimens of that species.

On searching among *Rubiaceæ* for the nearest parallel to *Gardneria*, I was struck with the very close resemblance in habit and foliage of a Singapore plant, determined by Gardner to be a species of *Cœlospermum*. It is in fruit only, but evidently belongs either to that genus or to *Gonochthodes*, of neither of which have we any authentic Javanese specimens, but which are probably not really generically distinct. The seeds of *Cœlospermum* are shaped like those of *Gardneria*; but they are enclosed in the crustaceous endocarp, so that the fruit, instead of being a berry, is a drupe with as many pyrenes as seeds. The number of these is four, as in many fruits of *Gardneria angustifolia*, and the genus is consequently placed among those with a four-celled ovary. The ovary, however, is not described by Blume; and, from the fact of the style being bifid only, one would be led to conjecture that it was two-celled only, with two collateral ovules in each cell, showing a still further analogy to *Gardneria angustifolia*.

I have mentioned but two *Gardnerias*, although four are described; but this has been done chiefly on phytogeographical grounds. On a careful comparison of a considerable number of specimens, I can find no difference between the Nilgherry *G. Wallichiana* and the original *G. ovata* from Khasiya; and a specimen communicated to me by the Leyden Museum of the *G. nutans*, Sieb. et Zucc., from Japan, agrees in every respect with the *G. angustifolia*, which is so abundant in Sikhim, Nepal, and Khasiya.

24. PAGAMEA, *Aubl.*

The ovary and fruit of this genus have been hitherto but little known. The seeds of Aublet's species, the only one as yet published, had not been described at the time I determined Schomburgk's *Loganiaceæ*; and, misled by fruits apparently nearly ripe, but filled with a fleshy pulp which had become granulated by drying, I totally misunderstood their structure. I have consequently misled DeCandolle also, who, in the 'Prodromus,' copied the character I had given, in contradiction to the older but more correct one of Jussieu. Mr. Spruce's labours have now supplied us not only with ripe seeds of the old *P. guianensis*, but also with fine specimens, in various states, of three other very distinct new species, from whence I am now enabled to complete the history of the genus.

The flowers, like those of many *Rubiaceæ*, have a tendency to become polygamous, by the abortion of the female organs in some flowers, and occasionally of the anthers in others. The calyx, corolla and anthers are correctly described in the 'Prodromus,' except that in one species the chaff-like hairs which line the lobes of the corolla are exceedingly short. The ovary, in many specimens of *P. guianensis*, and occasionally also in the other species, is short and fleshy, with two very small cells containing each a minute abortive ovule, and the style is then very short, usually divided to the base. Where the ovary is perfect, which I have seldom had occasion to observe in the common *P. guianensis*, it is much less fleshy, completely divided into two cells with one ovule in each, erect from the base, precisely as in *Psychotria*. The style is then elongated, divided much below the middle in *P. guianensis*, but less so in the others. The fruit is a greenish or black berry, or rather drupe, containing two crustaceous, almost bony pyrenes, with a flattish inner face and convex back. Each contains a single erect seed with a thin testa adhering to a cartilaginous albumen, very much ruminated, as in *Grumilea*. The embryo is small, nearly cylindrical and erect, near the base of the albumen, with a straight radicle about the length of the cotyledons. Such at least is the structure of the seeds in *P. guianensis* and *coriacea*, where I have seen them perfectly ripe.

The stipules of *Pagamea* are long, vaginate and deciduous, as in *Gærtnera*, from which it differs as *Psychotria* does from *Chasalia*, in the shortness of the tube of the corolla. The number of parts of the flower is also usually (though not always) four in *Pagamea*, five in *Gærtnera*; the inflorescence is axillary, not terminal, as might be inferred from the expressions in the 'Prodromus.' I have at least always observed two opposite axillary peduncles, which in the early stage appear to terminate the branches; but the bud between them soon grows out, leaving the peduncles one on each side at the base of the young shoot, instead of a single terminal peduncle in the dichotomy of two young shoots.

The whole genus has but a limited range in East tropical America. The old *P. Guianensis* is the widest spread, extending over Guiana and North Brazil; *P. capitata* is confined to Guiana and Surinam; the three others have only been found by Spruce on the Upper Rio Negro.

25. GÆRTNERA, *Lam.*

If *Pagamea* is the Loganiaceous counterpart of *Psychotria*, *Gærtnera* is, without doubt, that of *Chasalia*, from which genus it is absolutely undistinguishable except by the ordinal character of the free ovary and fruit, not always very easy to ascertain at the time of flowering, when the fleshy epigynous disk of *Chasalia* or *Psychotria* is often as large or larger than the ovary itself. The consequence has been, that many *Gærtneras* have been first described as *Chasalias*. The generic characters, originally drawn up from some of the Mauritius species, have since been slightly modified by Endlicher, and lastly by Blume, so as to include the Cingalese ones published by Arnott under the name of *Sykesia*. I have nothing to add to the detailed character in Blume's 'Museum Botanicum,' p. 173, nor even to remark upon, except that the phrase "cotyledonibus e basi tumidâ subulatis" does not refer at least to the *G. thyrsiflora*, where the cotyledons are short and thick. The seeds have, however, only been examined in a very few species. These are now rather numerous; for besides the fourteen Mauritius species enumerated in the 'Prodromus,' one has been found in West tropical Africa, five in Ceylon, of which one appears to extend over the Moluccas, and two in Singapore. It is possible that some others may exist in herbaria, confounded with *Psychotrias* and *Chasalias*. In some cases indeed, there is really considerable ambiguity; for although the fruit be always entirely superior, the ovary is sometimes semi-adherent. In the plant distributed by Wallich as *Pæderia ternata*, n. 6248, the ovary is really adherent, but separates so readily from the calyx, especially between the ribs, that, if not dissected with great care, it appears free. I had thus, in a note to the 'Niger Flora,' referred it to *Gærtnera*, although it be in fact a true *Rubiacea*, very near to *Psychotria*, if not a genuine species of that genus.

A singular anomaly is mentioned by DeCandolle in regard to the *G. calycina*, that two of the stamens are opposite to the lobes of the corolla, whilst the three others are normally alternate. I have only been able to examine unopened buds, in which I cannot perceive any such irregularity; but it may become developed as the corolla expands, in which case it cannot have any organic importance. The large coloured calyx, however, gives to the plant a peculiar aspect, which may justify the maintenance of the section *Ætheonema*, as proposed by DeCandolle.

Although I perfectly agree with Endlicher, Blume, and Wight, in the propriety of uniting *Sykesia* with *Gærtnera*, yet the comparatively short tube of the corolla, the hairs at its mouth, and the somewhat higher insertion of the stamens, may justify the maintenance of two of its species as a section analogous almost as much to *Psychotria* as to *Chasalia*, and showing a strong approach, as to flowers, to *Pagamea*.

In one of the new species described below, *G. rosea*, Thwaites, two of the stamens appear to be frequently abortive with short filaments; but I have had too few flowers to examine to ascertain whether this anomaly is constant or only accidental.

There are two doubtful genera usually placed at the end of *Loganiaceæ*: *Codonanthus*, G. Don, which has now been ascertained to be a Convolvulaceous plant not generically distinct from *Prevostia*; and *Anabata*, Willd., so imperfectly described, that it may be equally well attributed to half-a-dozen of the most distinct monopetalous orders.

The genus *Chætosus*, which I had at first referred to *Loganiaceæ*, is correctly placed by Alph. DeCandolle in *Apocyneæ*.

Dr. Lindley, in the 'Vegetable Kingdom,' attaches *Legnotideæ* to the end of *Loganiaceæ*, as their nearest probable allies; but this depends upon a view of affinities in which I cannot partake; for to my mind their close proximity to *Rhizophoreæ*, with a tendency towards *Lythrarieæ* and *Cunoniaceæ*, as indicated by Brown, does not admit of much doubt.

GENERUM LOGANIACEARUM SYNOPSIS.

Tribus I. ANTONIEÆ. Ovula in loculis plurima Semina alâ membranaceâ cincta.

* *Æstivatio corollæ valvata.*

1. *Antonia*. Bracteæ plurimæ imbricatæ calycem obtegentes. Corollæ tubus brevis.—America tropica.

2. *Usteria*. Bracteæ 2, parvæ. Corollæ tubus elongatus. Stamen perfectum unicum.—Africa tropica.

3. *Norrisia*. Bracteæ 2, parvæ. Corollæ tubus elongatus. Stamina tot quot lobi corollæ.—Asia tropica.

** *Æstivatio corollæ imbricata.*

4. *Gelsemium*.—America borealis, China et Sumatra.

Tribus II. EULOGANIEÆ. Ovula in loculis plurima. Fructus capsularis. Semina nuda, rariùs subalata.

* *Æstivatio corollæ valvata.*

5. *Spigelia*. Stylus supernè articulatus. Capsula compressa, circumscissè dehiscens.—America.

6. *Mitreola*. Capsula compressa apice biloba, lobis intus dehiscentibus. Flores pentameri.—America et India orientalis.

7. *Mitrasacme*. Capsula compressa apice biloba, lobis intus dehiscentibus. Flores tetrameri.—Australia et India orientalis.

** *Æstivatio corollæ imbricata.*

8. *Polypremum*. Capsula loculicidè dehiscens. Herba dichotoma.—America.

9. *Logania*. Capsula septicidè dehiscens. Flores sæpius pentameri.—Australia.

10. *Gomphostigma*. Capsula septicidè dehiscens. Flores tetrameri. Corolla subrotata.—Africa australis.

11. *Nuxia*. Capsula septicidè dehiscens. Flores tetrameri. Corolla tubo brevi supra basin transversè rupto. Stamina exserta.—Africa australis et calidior.

12. *Chilianthus.* Capsula septicidè dehiscens. Flores tetrameri. Corollæ tubus brevis non ruptus. Stamina exserta.—Africa australis.

13. *Buddleia.* Capsula septicidè dehiscens. Flores plerique tetrameri. Antheræ tubo corollæ inclusæ, v. ad faucem sessiles.—America, Asia, Africa.

*** *Æstivatio corollæ contorta.*

14. *Geniostoma.*—Mascarenhasia et Polynesia.

Tribus III. FAGRÆEÆ. Ovula in loculis plurima. Fructus baccatus indehiscens.

* *Æstivatio corollæ contorta.*

15. *Desfontainea.* Corolla 5-loba. Ovarium 5–3-loculare.—America australis.

16. *Fagræa.* Corolla 5-loba rarius 6–7-loba. Ovarium biloculare.—India orientalis et Polynesia.

17. *Potalia.* Corolla 10-loba. Placentæ 2 bilobæ.—America tropica.

18. *Anthocleista.* Corolla 10–16-loba. Placentæ 4 bilobæ.—Africa tropica.

** *Æstivatio corollæ valvata.*

19. *Strychnos.* Stamina supra medium tubi corollæ inserta. Ovarium biloculare.—America, Africa, et Asia calidiores.

20. *Brehmia.* Stamina ad basin corollæ brevis inserta. Ovarium septo evanido subuniloculare.—Africa et Mascarenhasia.

21. ? *Labordea.* Ovarium triloculare.—Ins. Sandwich.

*** *Æstivatio corollæ imbricata.*

22. *Nicodemia.*—Mascarenhasia.

Tribus IV. GÆRTNEREÆ. Ovula in loculis solitaria, rariùs 2 collateralia.

23. *Gardneria.* Ovula lateraliter peltatim affixa. Caulis scandens.—Asia calidior.

24. *Pagamea.* Ovula e basi erecta. Corolla vulgò tetramera tubo brevissimo.—America tropica.

25. *Gærtnera.* Ovula e basi erecta. Corolla vulgò pentamera tubo distincto nunc elongato.—Asia calidior et Mascarenhasia.

Species Prodromo Candolleano addendæ vel emendandæ :—

I. ANTONIA, *Pohl.* DC. Prod. vol. ix. p. 20.

Species unica :—

A. ovata, Pohl, Pl. Bras. Ic. t. 109.—*A. pilosa*, Hook. Ic. Pl. t. 64; Endl. Iconogr. t. 56.—*A. pubescens*, Bong. Mem. Acad. Petrop. Ser. 6. vol. iii. t. 1.

Hab. In Guiana Anglica (*Schomb.* coll. 1. n. 85 *a*; coll. 2. n. 520; *Rich. Schomb.* n. 822). In Brasiliæ variis locis (*Pohl, Mart. herb.* n. 540, *Gardn.* n. 2667, 2943, 4349*bis*, 5023 & 5024).

II. USTERIA, *Willd.* DC. Prod. vol. ix. p. 22.

Species unica :—

U. guineensis, Willd. Hook. Fl. Nig. t. 45, et Ic. Pl. t. 795.

Hab. In Africa tropica occidentali.

III. NORRISIA, *Gardn.* in Kew Journ. Bot. vol. i. p. 327.

Species unica :—

N. malaccensis, Gardn. l. c.—*Antonia Griffithii*, Wight, Illustr. vol. ii. t. 156*b*.

Hab. In Malacca (*Griffith*).

IV. GELSEMIUM, *Juss.* A. DC. Prod. vol. ix. p. 23.

Species sunt :—

1. G. NITIDUM, *Mich.*, foliis ex ovato-lanceolatis, inflorescentiis brevibus vix ramosis squamato-bracteatis, capsulis compressiusculis acuminatis.

Hab. In Virginia, Carolina, Georgia, Florida, Louisiana; Mexico (*Harris, Jurgensen*, n. 835), prov. Chiapas (*Linden*, n. 1658).

2. G. ELEGANS, foliis ovatis acuminatis, cymis trichotomis multifloris nonnisi ad ramificationes bracteatis, capsulis turgidis muticis.—*Medicia elegans*, Gardn. in Kew Journ. Bot. vol. i. p. 325.—*Leptopteris sumatrana*, Blume, Mus. Bot. vol. i. p. 240. fig. 34 (ex ic. et descr.).

Hab. In insula Hong Kong (*Champion*) et in Sumatra (*Blume*).

V. SPIGELIA, *Linn.* A. DC. Prod. vol. ix. p. 3.

Species Prodromo addendæ sunt :—

S. COULTERIANA, perennis, humilis, decumbens, glabra, foliis obovatis ovatisve obtusissimis, corollæ tubo ampliato limbo obliquo.—Caules e basi procumbente ramosa erecti, 2–3-pollicares. Folia 2–4-na, semipollicaria vel vix longiora. Calycis laciniæ capsula longiores. Corolla circa 8 lin. longa tubo ferè a basi ampliato.

Hab. In Mexico ad Zimapan, *Coulter*, n. 962.

S. longiflora et *S. pauciflora*, Mart. et Gal. Bull. Acad. Brux.; Walp. Rep. vol. vi. p. 496, a me non visæ subdubiæ.

Species delendæ sunt :—

S. Schomburgkiana, Benth. = *S. Humboldtiana*, Ch. et Schl.

S. gracilis, DC. = *S. spartioides*, Ch. et Schl.

S. multispicata, Steud. = *S. anthelmia*, Linn.

S. nervosa, Steud. = *S. anthelmia*, Linn.

VI. MITREOLA, *Linn.* A. DC. Prod. vol. ix. p. 8.

Species sunt:—

1. M. SESSILIFOLIA, *Torr. et Gr.*, annua, glabra, foliis sessilibus, pedicellis brevissimis, capsulæ subovoideæ lobis brevibus erectis v. basi leviter divergentibus.

Hab. In Americæ borealis civitatibus australioribus.

2. M. PETIOLATA, *Torr. et Gr.*, annua, glabra, foliis petiolatis, pedicellis brevissimis, capsulæ subovoideæ lobis brevibus erectis v. basi leviter divergentibus.

Hab. In Americæ borealis civitatibus australioribus, in insulis nonnullis Indiæ occidentalis, in Mexico (*Beechey*), Panama (*Seemann*), et in prov. Goyaz Brasiliæ (*Gardn.* n. 3897). — *M. paniculata,* A. DC. Prod. vol. ix. p. 9, quoad specimen Brasiliense.—Hook. Ic. t. 828.

3. M. OLDENLANDIOIDES, *Wall.*, annua, glabriuscula, foliis petiolatis, pedicellis brevissimis, capsulæ subtriangularis lobis ipsa vix brevioribus demum basi v. undique latè divergentibus.—Hook. Ic. Pl. t. 827.—*M. paniculata,* Wall. Cat. n. 4349; Cat. Burm. n. 1826.—Wight, Ic. t. 1600 (exclusis floribus figuræ majoris).—*M. inconspicua,* Zoll. et Mor. Verz. Pl. Jav. p. 55.

Hab. In India orientali; Bombay (*Dalzell*), Concan (*Law*), Sukanaghur (*Hamilton*), Burma (*Wallich*), Java (*Zollinger*).

4. M. PEDICELLATA, perennis, repens, foliis petiolatis subhirtellis, pedicellis flore longioribus, capsulæ latæ lobis brevibus demum latissimè divergentibus.—Caulis basi repens, ad nodos radicans, ramis floriferis adscendentibus, nunc 3–4-pollicaribus, nunc ½–1-pedalibus simplicibus. Stipulæ brevissimæ petiolos connectentes, ad petiolos utrinque 1–2-aristatæ. Folia ovato-acuminata v. oblongo-lanceolata, 2–4 poll. longa, basi in petiolum angustata, ad margines et subtus ad venas sæpissimè ciliato-hirta. Cymæ paucæ, longè pedunculatæ. Pedicelli graciles, 1–2 lin. longæ. Flores et fructus parvi. Sepala ovata, margine membranacea. Stylus basi fissus, mox deciduus, apice breviter bifidus. Capsula quam in *M. oldenlandioide* minor, lobis primum erectis, mox divaricatis, demum sæpè recurvis. Semina ferè globosa.

Hab. In Sikhim (*Hooker fil.*).

VII. MITRASACME, *Labill.* A. DC. Prod. vol. ix. p. 9.

Sectio I. PLECOCALYX, *Don.* Species unica:—

1. M. AMBIGUA, *Br.*; DC. l. c. p. 12.—Annua, *M. nudicauli* habitu affinis, imprimis calycis forma et corolla tenui distincta.

Sectio II. DICHELOCALYX, *Don.* Species 3, omnes Australasiæ:—

2. M. PARADOXA, *Br.*, erecta, ramosa, foliata, calyce latè bifido, stylis supernè connatis.—*M. divergens,* Hook. fil. in Lond. Journ. Bot. vol. vi. p. 276.

Hab. Swan River (*Drummond*), King George's Sound (*Bauer, Wakefield*), Victoria (*Ferd. Müller*), Tasmania (*Gunn*).

3. M. NUDA, *N. ab E.*, foliis radicalibus, scapo erecto filiformi aphyllo apice umbellifero, calyce latè bifido, stylis supernè connatis.

Hab. Swan River (*Preiss*).

4. M. DISTYLIS, *Ferd. Müll.*, pusilla, decumbens, foliata, calyce truncato subbifido, stylis liberis v. vix apice connatis.—Planta semipollicaris v. subpollicaris habitu *Montiæ* v. *Microcarpææ* similis. Folia oblonga v. linearia, 1–3 lin. longa. Pedicelli sæpius solitarii, filiformes, semipollicares. Flores quam in *M. paradoxa* multo minores, calyce breviore, lobis rotundatis obtusissimis, corolla calyce brevior, ut in *M. paradoxa* stipitata, lobis brevibus latis. Stamina *M. paradoxæ*. Styli breves, stigmatibus distinctis coronati, et vix levissimè cohærentes. Capsula inclusa.
Hab. In montibus Grampians prov. Victoriæ (*Ferd. Müller*) et ad George Town in Tasmania (*Gunn*, n. 2019).

Sectio III. MITRAGYNE, *Endl.* cum *Hologyne*, Don.

Species 17 Australasicæ, 3 Indicæ :—

* *Annuæ.*

5. ***M. phascoides***, Br., DC. l. c. p. 11.—Planta minima vix 3-linearis.

6. ***M. laricifolia***, Br., DC. l. c. p. 10.—Planta bipollicaris, corolla minima tenui.

7. ***M. ramosa***, Br., DC. l. c.—*M. laricifoliæ* similis, imprimis corolla brevi diversa.

8. ***M. multicaulis***, Br., DC. l. c.—A me non visa.

9. ***M. paludosa***, Br., DC. l. c. p. 11.—*M. alsinoidi* affinis, sed ramosissima, angustifolia, et corollæ forma diversa.

10. ***M. pygmæa***, Br., DC. l. c.—Speciminibus minoribus *M. nudicaulis* simillima.

11. M. NUDICAULIS, *Reinw.*, DC. l. c. p. 12, caule basi pilosulo, foliis subradicalibus patentibus, scapo glabro foliis paucis minimis erectis, umbella pauciflora, calycis lobis corollæ tubi dimidium subæquantibus, stylo basi per anthesin indiviso (mox bifido).—*M. chinensis*, Griseb. in Pl. Meyen. p. 51 (ex descr.).
Hab. Khasiya (*Griffith, Hook. fil. et Thomson*), Assam (*Mrs. Mack*), China prope Canton.

12. M. INDICA, *Wight*, Icon. t. 1601, glabra, caule foliato pedicellis axillaribus v. summis subumbellatis, calycis lobis corollæ tubo vix brevioribus, stylo basi per anthesin bifido (v. rarius indiviso ?).—*M. crystallina*, Griff. Notulæ, pars iv. p. 87 ; Ic. t. 383. f. 2.—*M. pusilla*, Dalz. in Kew Journ. Bot. vol. ii. p. 136.
Hab. In Indiæ orientalis peninsula (*Dalzell, Law, Wight*).

13. M. CAPILLARIS, *Wall.*, DC. l. c. p. 11, caule basi pilosulo foliato, foliis lanceolatis, pedunculis umbelliferis subnudis glabris, calycis lobis corollæ tubi dimidium subæquantibus, stylo basi per anthesin indiviso (mox bifido).—*M. trinervis*, Spanoghe in Linnæa, vol. xv. p. 335.—*M. Malaccensis*, Wight, Ic. t. 1601.—*Limnophila campanuloides*, Benth. in Wall. Cat. n. 3908.—Variat corolla longiore v. breviore, calycis laciniis longioribus brevioribusve, latioribus angustioribusve, &c.
Hab. In terra Canara (*Hohenacker*, n. 590), Nepalia (*Wallich*), Tavoy (*Go-*

mez), Malacca (*Griffith*), Moulmeyn (*Lobb*, n. 348; specimina sæpe pedalia v. ultra), Hong Kong (*Hinds*).

14. *M. alsinoides*, Br., DC. l. c. p. 11.—*M. capillari* valdè affinis. Variat caule basi foliisque glabris v. pubescentibus.

15. *M. prolifera*, Br., DC. l. c. p. 10.—Variat foliis ovatis. A præcedentibus differt imprimis corollæ tubo subgloboso calycem paullo superante, limbo tubum subæquante patente.

16. M. LÆVIS, glaberrima, caule foliato subramoso, foliis oblongo-lanceolatis rigidulis uninerviis subtus glaucis, umbella terminali, calycis semi-4-fidi lobis latis rigidis corollæ tubi dimidium æquantibus, stylo basi per anthesin indiviso.—Caules graciles 6–10-pollicares. Folia 3–4 lin. longa, crassiuscula, floralia minora. Pedunculi et pedicelli elongati. Flores magnitudine *M. capillaris*, siccitate virescentes, et corollæ limbus patens videtur ut in *M. prolifera*. Capsula parva, subglobosa, apice vix ante maturitatem bifida.

Hab. Ad Port Essington, Australiæ tropicæ orientalis (*Armstrong*).

17. *M. stellata*, Br., DC. l. c. p. 11.—Caules semipedales ad pedales in parte inferiore tantum foliati. Flores in umbellas simplices v. compositas conferti, parvi.—Formam latifoliam legit ad Port Essington cl. *Armstrong*.

18. *M. elata*, Br., DC. l. c. p. 11.—Caules 1–1½-pedales. Folia latitudine varia. Corollæ tubus 4–6 lin. longus.

19. *M. connata*, Br., DC. l. c. p. 11.—Statura et corolla *M. elatæ*. Folia angusta, vix aliter nisi stylis per anthesin a basi connatis differre videtur.

** *Perennes, a basi ramosissimæ.*

20. *M. polymorpha*, Br., DC. l. c. p. 10.—Species prope Port Jackson vulgaris magnoperè variat hirsutia, et cum ea jungendæ videntur *M. canescens*, Br.—DC. l. c.—*M. hirsuta*, Presl; Walp. Ann. vol. vi. p. 496.—Necnon verosimiliter *M. squarrosa*, Br., *M. cinerascens*, Br. et *M. Sieberi*, DC., a me non visæ.

21. M. DIFFUSA, ramosissima, diffusa, pilosa, foliis linearibus sublanceolatisve ciliatis, pedicellis hirtis axillaribus v. summis subumbellatis, calycis laciniis lanceolatis ciliatis corollam superantibus.—Habitus *M. pilosæ*, sed folia 4–6 lin. longa, semilineam v. raro ferè lineam lata, pedicelli folio æquales v. sublongiores, et calycis laciniæ angustiores acutæ. Corolla parva, subcampanulata semi-4-fida. Styli basi soluti apice cohærentes.

Hab. Ad Stradbrooke River, Australiæ orientalis (*Fraser* in herb. *Hooker*).

22. *M. pilosa*, Labill.—DC. l. c. p. 11.

23. *M. serpyllifolia*, Br., DC. l. c.—A *M. pilosa* differt imprimis glabritie. Specimina juniora tantum vidi. Ab illis tamen haud differre videtur *M. perpusilla*, Hook. fil. in Lond. Journ. Bot. vol. vi. p. 275. Calycis laciniæ in hac angustiores quam in *M. pilosa*. Planta Browniana circa Portum Jackson lecta fuit, Hookeriana in Tasmania.

24. M. MONTANA, *Hook. fil. MSS.*, humilis, ramosissima, diffusa, glabra,

foliis obovatis subcarnosis, floribus sessilibus terminalibus solitariis, stylis distinctis, capsula latè triangulari compressa supra concava.—Caules perennes ½–2-pollicares, cæspitoso-ramosissimi. Folia in petiolum brevissimum angustata, raro margine pilis paucis brevibus ciliata. Calyces profunde fissi, lobis duobus paullo latioribus, capsulam æquantibus. Corolla (quam nonnisi emarcidam vidi) calyci æqualis, lobis brevibus. Antheræ subsessiles ad apicem tubi insertæ. Styli breves, paullo post anthesin jam longè distantes, apice leviter introflexi. Capsula apice 2 lin. lata, truncata et obscurè sinuato-biloba, valdè compressa, ad angulos stylorum vestigiis acuta, supra marginibus valdè inflexis concava, ad angulos internos cavitatis dehiscens. Placentæ axiles, 4–6-spermæ.

Hab. Ad montes Wellington et Black Buff, Tasmania (*Gunn*).

VIII. Polypremum, *Linn.* DC. Prod. vol. iv. p. 435, et vol. ix. p. 12.

Species unica:—

P. procumbens, Linn., DC. l. c.—*P. Schlechtendahlii*, Walp. in Pl. Meyen et ejusd. Repert. vol. vi. p. 56.

Hab. In civitatibus australioribus Americæ borealis, in Mexico et Columbia (et Chile?).

IX. Logania, *R. Br.* DC. Prod. vol. ix. p. 25.

Species Prodromo addendæ v. emendandæ:—

L. angustifolia, Sieb. in DC. Prod. l. c. et *L. linifolia*, Schlecht.; Walp. Ann. vol. i. p. 512, inter *L. floribundam* et *L. revolutam* intermediæ, cum hac pro varietatibus *L. floribundæ* habendæ videntur, hæc enim species, circa Port Jackson vulgaris magnoperè variat et latitudine foliorum et inflorescentia copiosa vel parca.

L. cordifolia, Hook., Walp. Ann. vol. iii. p. 74, et foliis et inflorescentia ab omnibus mihi notis longè distat.

L. hispidula, Nees in Pl. Preiss. vol. i. p. 368 valdè affinis videtur *L. serpyllifoliæ*, Br., cujus varietates plures legit Drummond in Australia austro-occidentali.

L. depressa, Hook. fil. e Nova Zealandia habitu *L. fasciculatæ*, Br., approximata, foliorum forma aliisque notis longè diversa. Speciem *L. fasciculatæ* affiniorem (nec forte diversam?) communicavit F. Müller ex Australiæ austro-orientalis montibus sub nomine *L. alpinæ*. Flores tamen in specimine desunt.

L. hyssopoides, Nees, Pl. Preiss. vol. i. p. 368, et *L. centaurium*, Nees, l. c. vol. ii. p. 240 vix a *L. campanulata*, Br., differunt.

L. bracteolata, Nees, l. c. vol. i. p. 367, mihi ignota, ex descriptione sua distinctissima est. Quoadfolia, habitus et inflorescentiam cum sequente convenit, corolla pentamera et capsulæ loculis pleiospermis (si ritè observata) longè differt.

L. MICRANTHA, sp. n., fruticulosa, ramosissima, glabra, foliis (parvis) lineari-

bus, floribus minimis solitariis corymbulosisve tetrameris, ovarii loculis uniovulatis.—Fruticulus ferè in omnibus notis cum descriptione *L. bracteolatæ* conveniens præter numerum partium floris et ovarii structuram. Tota glabra est v. rarius pubes minima in partibus novellis sub lente observatur. Folia 3–4 lin. longa, obtusa, coriacea, margine revoluta. Pedunculi in axillis supremis 1–3-flori, v. ad apices ramorum in corymbum 6–12-florum dispositi. Flores minimi, nutantes. Bracteolæ 2 angustæ ad basin pedicelli, 2 latiores, interdum ovatæ, sub calyce. Calycis laciniæ ovatæ, interdum minutissimè ciliatæ. Corollæ faux nuda. Ovarium biloculare, ovulis solitariis prope basin affixis. Stylus brevissimè conicus apice stigmatoso subbilobo. Capsula globosa, coriacea, septicidè dehiscens, carpellis loculicidè bifidis. Semina hemisphærica, facie interna placentæ crassiusculæ oblongæ demum liberæ peltatim affixa. Testa minutè impresso-punctata. Albumen cartilagineum. Embryo brevis, rectus.

Hab. In Australia austro-occidentali (*Drummond*, coll. 5. n. 252).

L. capensis, Eckl.; DC. Prod. vol. ix. p. 26, ex Africa australi, a nemine inter exploratores hodiernos visa, delenda videtur.

L. paniculata, Kunth et Bouché, Walp. Ann. vol. i. p. 513, in horto Berolinensi descripta, planta videtur a genere aliena. Flores dioici dicuntur, styli distincti, &c.

X. GOMPHOSTIGMA, *Turcz.* Benth. in DC. Prod. vol. x. p. 433.

Species unica:—

G. scoparioides, Turcz. l. c., ex Africa australi.

XI. NUXIA, *Lam.* A. DC. Prod. vol. x. p. 434.

Speciebus in Prodromo descriptis addendæ sunt *N. pubescens*, *N. tomentosa* et *N. emarginata*, omnes a Sondero in Linnæa, vol. 23, e plantis Zeyherianis austro-Africanis illustratæ; quarum duæ priores verosimiliter unius speciei formæ.

XII. CHILIANTHUS, *Burch.* A. DC. Prod. vol. x. p. 435.

Species 4 jam in Prodromo recensitæ.

XIII. BUDDLEIA, *Linn.* Benth. in DC. Prod. vol. x. p. 436.

Species Prodromo addendæ v. corrigendæ:—

B. Colvillei, Hook. fil. Ill. Pl. Himal. t. 18, species pulcherrima Himalayana nulli hucusque cognitæ proxima.

B. coriacea, et *B. aromatica*, Remy in Ann. Sci. Nat. Par. 3 Ser. vol. viii. pp. 226, 227, e Bolivia, mihi ignotæ.

B. pseudoverticillata, Mart. et Gal. = *B. sessiliflora*.

B. obtusifolia, Mart. et Gal. = *B. microphylla*.

B. elliptica, Mart. et Gal., e Mexico, mihi ignota est.

Buddleieæ species decem e seminibus Mexicanis in horto Berolinensi natæ et a Kunth et Bouché divulgatæ, omnes denuo inquirendæ verosimiliter pleræque varietates specierum jam in Prodromo descriptarum.

B. diversifolia, Vahl, Benth. in DC. Prod. vol. x. p. 445 et *B. rondeletiæflora*, Benth. l. c. ad genus *Nicodemiam* referendæ sunt.

XIV. GENIOSTOMA, *Forst.* DC. Prod. vol. ix. p. 26.

Species Mauritianæ sunt:—

1. *G. pedunculatum*, Boj., DC. Prod. vol. ix. p. 28.—*G. parviflorum*, Boj., DC. l. c. p. 27.—Connectivum vix loculos antheræ excedens, appendice brevissima ciliolata.

2. *G. cordifolium*, Boj., DC. l. c.—Connectivum ultra loculos antheræ productum, appendice ovato-triangulari ciliolata.

3. *G. ovatum*, Boj., DC. l. c.—*G. lanceolatum*, Boj. ?, DC. l. c. ?—Folia forma quam maximè variabilia. Corollæ laciniæ ovatæ vix lineam longæ. Connectivum ultra loculos non aut vix productum. Capsula ovoidea 4–5 lin. longa, vix duplum diametri sui æquans.

4. *G. angustifolium*, Boj., DC. l. c.—A me non visum.

5. G. OBOVATUM, *Boj. MSS.*, glabrum, foliis obovatis oblongisve obtusis v. vix acutis, cymis abbreviatis, calycis lobis ovatis acutiusculis, corollæ lobis lanceolatis intus basi villosis, capsulis oblongis latitudine sua 3–4-plo longioribus.—Affinis *G. ovato*, sed folia crassiora, corollæ multo majores, laciniis 1½ lin. longis; antheræ appendice longa lineari ciliata terminatæ et capsulæ 7–8 lin. longæ.

Hab. In sylvestribus ins. Mauritii ad Colville Bridge in Grand Bassin (*Bojer*).

Species Polynesicæ:—

6. G. FAGRÆOIDES, glaberrima, foliis amplis ellipticis utrinque acutis, calycis laciniis acutis, placentis distinctis, seminibus stipitatis.—Folia 4–6-pollicaria, fere *Fagrææ*. Stipulæ intrapetiolares, breviter vaginantes, truncatæ. Flores non vidi. Capsulæ 7–8 lin. longæ, crassæ, valvulis crasso-coriaceis recurvis. Placentæ 2 lineares, vix carnosæ. Semina generis, sed funiculi filiformes semine ipso vix breviores.

Hab. In ins. Bonin (*Beechey*).

7. G. CRASSIFOLIUM, foliis obovatis ovatisve obtusissimis subcarnosis pubescentibus glabratisve, calycis lobis ovatis acutiusculis, corollæ laciniis intus basi barbatis.—Frutex 12–16-pedalis. Folia 2–3-pollicaria, crassa, semper obtusissima, basi rotundata v. breviter angustata, petiolo apice dilatato, subtus uti ramuli puberula v. in var. β. glabra. Cymulæ a basi v. ad medium trichotomæ, petiolo paullo longiores. Flores quam in *G. rupestri* paullo majores, tubo calyce breviore, limbo patente, lobis ovatis obtusis basi medio pilosis margine vix ciliolatis. Stamina ad faucem inserta, filamentis brevibus, antheris ovatis corollam subæquantibus, connectivo loculos non superante, apice nudo v. ciliis paucis penicillato. Ovarium puberulum. Stigma ovoideum v. globosum, minutè puberulum. Capsula (in var. β) 3 lin. longa.

Frequens in insula Isle of Pines dicta juxta Novam Caledoniam in locis sylvaticis ad pedem montis (*Milne*).

β. *glaberrimum*, foliis paullo majoribus.—In ins. Angau et Ovalau (ins. Feejee) (*Milne*), et ins. Sandwich teste herb. Hooker., sed hic fortè latet error quidam.

8. *G. rupestre*, Forst., DC. Prod. vol. ix. p. 26.—*G. hæmospermum*, Steud., DC. l. c. p. 27.—Blume, Mus. Bot. vol. i. p. 238.—In ins. Java (*Lobb*, &c.), Feejee (*Amer. Explor. Exped.*), Tanna e Novis Hebridibus (*G. Forster*).

9. *G. reticulatum*, Blume, l. c. p. 239.—Java.—A me non visum.

10. *G. montanum*, Zoll. et Mor. Verz. Pl. Jav. p. 58.—Mihi ignotum. An *G. rupestris* var.?—Java.

11. *G. ligustrifolium*, A. Cunn.; Hook. Ic. t. 430; DC. Prod. vol. ix. p. 27.—In Nova Zeelandia.

12. *G. micranthum*, DC. l. c.—Mihi ignotum.—In ins. Marianis.

13. G. CUMINGIANUM, foliis elliptico-lanceolatis acuminatis basi acutis, cymis brevibus, calycis lobis ovatis obtusis, corollæ lobis basi intus villosis.—Folia et inflorescentia *G. ligustrifolii* sed ab omnibus diversum calycis lobis apice minimè acuminatis. Cymulæ pluriflorae in speciminibus Cumingianis, 1–3-floræ in Lobbianis. Corollæ laciniæ intus basi tantum pilosæ, nec ferè in tota superficie ut in *G. ligustrifolio*. Antheræ glabræ. Stylus brevis, stigmate glabro.

Hab. In ins. Philippinis (*Cuming*, n. 864; *Lobb*, n. 450).

14. *G. lasiostemon*, Blume, Mus. Bot. p. 239, e Java, mihi ignotum.

XV. DESFONTAINIA, *Ruiz et Pavon*. Dun. in DC. Prod. vol. xiii. pars 1. p. 675.

Ovarium 5- rarius 4–3-loculare, septis in parte superiore ovarii vix in medio cohærentibus. Ovula in quoque loculo plurima (circa 10) ex angulo interno pendula. Bacca completè v. ferè completè 5–3-locularis.

Species unica:—

D. spinosa, R. et P. in Andibus Americæ australis crescens a Nova Granada usque ad fretum Magellanicum. Formæ sub nomine *D. splendentis*, H.B.K., *D. Hookeri*, Dun., et *D. acutangulæ*, Dun., editæ, inter se intermediis numerosis junctæ, vix pro varietatibus distinguendæ sunt.

XVI. FAGRÆA, *Thunb.* Blume, Mus. Bot. p. 163.

Species sunt:—

§ 1. *Corymbosæ*, cymis paucifloris ad apices ramorum subcorymbosæ. Flores majusculi v. maximi.

* Longifloræ, *tubo corollæ longè exserto supra medium v. apice tantum ampliato.*

F. carnosa, Jack.—Moulmeyn (*Lobb*).

F. tubulosa, Bl. e Sumatra, ex auctore *F. carnosæ* affinis mihi ignota.

F. zeylanica, Thunb. In ins. Ceylon (Hb. Sm. e herb. Linn. fil., Gardner, &c.).

F. BERTERIANA, *A. Gray, MS.*, foliis obovato-oblongis obtusissimis v. breviter acuminatis longiusculè petiolatis coriaceis crassis obsoletè venosis, petiolorum basi stipulacea brevi rotundata, corymbo terminali brevi trifido v. trichotomo, corollæ tubo elongato supra medium ampliato calyce triplo longiore.—Arbor 30-pedalis affinis *F. zeylanicæ*, corollæ tubi parte tenui longè exserta, brevior tamen est, corolla tota 2½–3-pollicaris nec 4–5-pollicaris. Antheræ angustiores videntur.—*Carissa grandis*, Berter., et eo teste *Pua* incolarum.

Hab. In ins. Societatis (*Bertero, Bidwill, Hinds, Barclay*), ins. Nukahiva e Marquesas (*Barclay*), in Archipelago Louisiade dicto (*Macgillivray*).

F. lanceolata, Blume.—In Java (*Lobb, Junghuhn*). Species ab auctore optimè illustrata inter longifloras et latifloras ferè media.

F. Walliehiana.—*F. lanceolata*, Wall. Cat. n. 1599.—*Cyrtophyllum*? *lanceolatum*, A. DC. Prod. vol. ix. p. 31.—In ins. Penang (*Wallich*).—Cymæ subsessiles, laxè 3–5-floræ. Corollæ tubus tenuis longè exsertus. Flores multo minores quam in præcedentibus, duplo tamen longiores quam in *F. fragrante.*

** Latifloræ, *corollæ infundibuliformis tubo a basi v. jam infra medium usque ad faucem dilatato.*

F. auricularia, Jack.—Malacca (*Griffith*), Java (*Lobb, Zollinger*, &c.).

F. truncata, Blume, e Celebes, mihi ignota, huic affinis dicitur.

F. plumeriæfolia, A. DC.—In ins. Philippinis (*Cuming*).

F. obovata, Wall., Bot. Mag. t. 4205.—In montibus Khasia (*Wallich, Hook. fil. et Thomson*).

F. coromandeliana, Wight, Ic. t. 1316.—Specimen unicum vidi e Peninsula in herb. Stocks. Vix a præcedente differre videtur petiolis abbreviatis.

F. crassifolia, Blume (ex descr. et ic.).—In Malacca (*Griffith*), Rangoon (*MacLelland*).—*F. obovatæ* valdè affinis, differt paullulum floribus 1–3nis subsessilibus et fortè corollæ tubo breviore latiore.

F. globosa, Wall., e Chappedong et Tavoy, cujus flores ignoti sunt, est verosimiliter eadem ac *F. crassifolia.*

F. littoralis, Blume, a me non visa, paullulum differt ex icone, fructu oviformi.

F. obovata-javana, Blume, ex icone et descr. quasi intermedia videtur inter *F. obovatam* et *F. malabaricam.*

F. malabarica, Blume, Wight, Ic. t. 1317 (*F. obovata*, Griff. Notul. Pars iv. p. 35, Ic. t. 382), præcedentibus valdè affinis. Folia *F. obovatæ*, inflorescentia laxior, calyx brevior, corollæ paullo minores.—In peninsula indica (*Stocks*), specimina etiam vidi in horto Calcuttensi culta. Adsunt etiam specimina Ceylonensia a Champion et Thwaites lecta inflorescentia calyce corollaque *F. malabaricæ* donata, foliis ut in *F. coromandeliana* brevè petiolatis. Forte 6 præcedentes omnes *F. obovatæ* varietates sunt.

F. KHASIANA, foliis longiusculè petiolatis oblongo-ellipticis acuminatis basi angustatis crassis subeveniis, cymis laxè trichotomis paucifloris, calycis laciniis margine membranaceis, corollæ tubo ferè a basi dilatato, ovario supernè uniloculari, bacca ovoideo-oblonga.—A præcedentibus floribus minoribus et baccis parvis primo intuitu distinguitur. Folia iis *F. obovatæ* angustiora, longius acuminata, 3–7 poll. longa, 1½–2½ poll. lata, crassa, siccatione punctato-rugosa, costa subtus prominente, venis raro conspicuis. Corymbi subsessiles, laxi, bis terve trifidi, pedicellis ultimis 2–3 lin. longis. Flores quoad formam iis *F. malabaricæ* subsimiles sed vix sesquipollicares. Calyces 4–5 lin. longi, lobis orbiculatis margine latè attenuatis ferè scariosis. Corollæ tubi pars tenuis vix calyce longior. Ovarium disco crasso insidens, basi biloculare, superne uniloculare placentis ibidem parietalibus basi confluentibus. Bacca ferè matura 9 lin. longa, angustè ovoidea, ferè acuta. Semina pulpa carnosa semi-immersa, numerosa, testa maculata, albumine carnoso v. ferè cartilagineo. Embryo (in semine nondum maturo ?) minimus.

Hab. In montibus Khasia (*Griffith, Simons, Dr. Mack, Hook. fil. et Thomson*).

Speciem ut videtur novam ab Asa Gray edituram, præcedenti affinem, foliis latis, calyce minore, corollæ tubo longiore, legit *American Exploring Expedition* in ins. Feejee. Inflorescentia *F. lanceolatæ*, Wall., sed flores longè diversi.

F. minor, Blume, e Moluccis foliis basi non angustatis a plerisque hujus sectionis differt. Specimen vidi e Borneo (*Lowe*) cum icone Blumeana satis conveniens.

Supersunt species decem a Blumeo enumeratæ mihi omnino incognitæ.

§ 2. *Racemosæ*, cymis paucifloris brevibus secus pedunculum terminalem oppositis, in racemum plus minus elongatum dispositis.

F. racemosa, Jack, teste ipso Jackio, eadem est ac *F. volubilis*, Wall. Mihi forma videtur inter hanc et *F. morindæfoliam*, Blume, media et varietates tres in speciem unicam jungit, nomine antiquiore *F. racemosæ*, Jack, salutandam.

Hab. In Moluccis; frequens in Malacca, ins. Philippinis, &c.

F. CRASSIPES, foliis amplis ellipticis breviter acuminatis basi obtusis, petiolorum basi stipulacea brevissimè connata truncata, cymis plurifloris in racemum brevem subcorymbosum longè pedunculatum coarctatis, corolla crassa infundibulari laciniis subrotundis tubo lato triplo brevioribus.—Folia 10-pollicaria ferè *F. racemosæ* sed magis coriacea, venis arcuatis subtus prominentibus, petiolo brevi crasso torto. Pedunculus 6–10-pollicaris, crassus, medio interdum bracteis 2 subfoliaceis instructus. Cymarum paria 2–3, inferiores pedunculatæ, superiores coarctatæ, singulæ sub-5-floræ. Pedicelli pollicares, crassi. Calyx *F. racemosæ* v. paullo major. Corolla crassa, sesquipollicaris v. paullo longior, tubo basi lato, fauce ampliata minus tamen quam in *F. racemosa*, limbi lobis subæqualibus. Stamina lobis corollinis paullo breviora. Ovarium completè biloculare, placentis in medio dissepimento bifidis. Bacca junior ferè globosa. Affinis ex descr. *F. coarctatæ*, Blume, cujus tamen corolla cum illa *F. morindæfoliæ* (*F. racemosæ*) comparatur.

Hab. In ins. Labuan (*Motley*).

F. LIGUSTRINA, *Blume*, var.? *brachystachya.*—Pedunculus 1½–2-pollicaris. Racemi rhachis 1–1½-pollicaris. Cymæ sessiles, oppositæ, trifloræ. Pedicelli breves. Corolla pollicaris, tubo tenui supra medium campanulato, dilatato. Ovarium supernè uniloculare, placentis ibidem parietalibus basi confluentibus.

Hab. In Singapore (*Lobb*).

Species Blumeana vera, cum aliis sex ejusdem auctoris hujus sectionis mihi ignotæ sunt.

§ 3. *Parvifloræ*, corymbis supradecompositis multifloris.

F. fragrans, Roxb.—*F. peregrina*, Blume? In Martabania et Penang (*Wallich*), Tavoy (*Gomez*), Mergui et Malacca (*Griffith*).

F. speciosa, Blume.—*F. elliptica*, Roxb.?—In Java (*Lobb*, n. 76).

F. Kimangu et *F. picrophlœa*, Blume, mihi ignotæ sunt.

F. tetragona, Spanoghe, Linnæa, vol. xv. p. 326, ex descr. e genere removenda erit.

F. Malayana, Mart., est forte *Tabernæmontana corymbosa*?

XVII. POTALIA, *Aubl.* DC. Prod. vol. ix. p. 36.

Species unica:—

P. amara, Aubl.—*P. resinifera*, Mart.—In Cayenna (*Martin*). Ad Rio Negro superiorem (*Spruce*).

XVIII. ANTHOCLEISTA, *Afzel.* DC. Prod. vol. ix. p. 96.

Species unica:—

A. nobilis, Don.—*A. macrophylla*, Don.—*A. Vogelii*, Planch. in Hook. Ic. t. 793, 794, et Fl. Nig. t. 43, 44.—In Africa tropica occidentali (*G. Don*, *Vogel*, &c.).

XIX. STRYCHNOS, *L.* A. DC. Prod. vol. ix. p. 12.

I. Species Asiaticæ v. Africanæ.

* SCANDENTES, *a brevifloris ad longifloras ordinatæ.*

1. S. MINOR, *Blume*, A. DC. Prod. vol. ix. p. 14, scandens, glabra v. minutè puberula, cirrhis simplicibus, foliis ovatis breviter acuminatis, cymis brevibus axillaribus terminalibusque, floribus plerisque tetrameris, corollæ tubo laciniis breviore.—Folia 3–5-nervia, nunc glaberrima, nunc uti petioli ramuli juniores et inflorescentia plus minus pubescentia, pilis minutis strigosis.

Cirrhi oppositifolii (folio subtendente abortiente squamæformi). Cymæ petiolo paullo longiores. Calyx profundè 5-fidus, lobis ovatis ciliatis nunc obtusissimè rotundatis, nunc acutiusculis. Corolla vix 1½ lin. longa, laciniis supra barbatis. Antherarum loculi basi ciliis paucis barbati. Ovarium biloculare, ovulis in quoque loculo 8–10. Bacca mono- vel oligo-sperma.

Hab. In ins. Ceylon, ubi varietates sequentes observantur:—

α. *nitida*, foliis ovatis subbipollicaribus basi angustatis, petiolo 2–3 lin. longo, cymis laxioribus terminalibus axillaribus.—In ins. Ceylon (*Walker*, *Thwaites*, n. 2516). Huc etiam pertinere videtur Icon Rheedii, vol. vii. t. 5.

β. *ovata*, foliis paullo minoribus, basi rotundatis opacis, cymis plerisque axillaribus densis paucifloris.—In ins. Ceylon (*Kelaart*).

γ. *angustior*, foliis angustius ovatis magis acuminatis, petiolo 1–2 lin. longo, cymis plerisque axillaribus.—In ins. Ceylon (*Walker*, *Thwaites*, n. 187).

δ. *parvifolia*, foliis vix pollicaribus, ovatis v. rarius obovatis, cymis paucifloris plerisque terminalibus.—In ins. Ceylon (*Gardner*, n. 580).

2. S. COLUBRINA, *Linn.* ?, A. DC. Prod. vol. ix. p. 14 ?, glabra, scandens, cirrhis plerisque bifurcatis, foliis ovatis ellipticisve obtusis v. vix acuminatis, cymis laxis axillaribus terminalibusque, floribus plerisque pentameris, corollæ tubo laciniis breviore.—*Modira Caniram*, Rheede, Hort. Malab. vol. viii. t. 24.—*S. bicirrhosa*, Lesch., A. DC. Prod. vol. ix. p. 16.—Folia nunc iis *S. minoris* similia, nunc sæpius majora et proportione longiora. Cirrhi ut in *S. minore* oppositifolii, folio subtendente ad squamam reducto, sed sæpius bifidi sunt et sub bifurcatione bibracteolati; rarius occurrunt hinc inde simplices. Flores magnitudine *S. minoris*, sed semper pentameros nec tetrameros vidi. Fructus multo major quam in *S. minore*.

Hab. In Peninsula Indiæ Orientalis, in montibus Nilgherry (*Leschenault*), circa Madras (*Wight*, Wall. Cat. 1589 A, B, & C, et 4455 B*), in Terra Canara (*Law*). Specimina in herbariis nostris ad speciem ritè elucidandam haud sufficiunt.

3. S. MALACCENSIS, scandens, minute puberula, cirrhis simplicibus v. in ramulis aphyllis geminis, cymis interruptè paniculatis, pedicellis brevissimis, floribus pentameris, corollæ tubo laciniis breviore.—*S. colubrina*, Wall. in Roxb. Fl. Ind. vol. ii. p. 264 ?—Folia in speciminibus suppetentibus latè ovata, 3-pollicaria, quintuplinervia, costis petiolis ramulis inflorescentiaque puberulis; folia adulta coriacea glabrata. Pedunculi axillares, folio sublongiores, ad apicem cyma densa coronati, additis cymis 2 v. 4 secus pedunculum per paria dissitis. Flores parvi *S. colubrinæ*. Laciniæ corollæ prope basin densè barbati. Antheræ basi barbatæ.

Hab. In Malacca (*Griffith*). Species ulterius cum *S. colubrina* comparanda.

4. S. AXILLARIS, *Colebr.*, A. DC. Prod. vol. ix. p. 13, scandens, cirrhis simplicibus, foliis ovatis acuminatis, cymis densis axillaribus, floribus pentameris, corollæ tubo laciniis breviore.—Ramuli novelli pubescentes demum glabrati. Folia 1½–2½-pollicaria, acumine longo angusto. Cirrhi sæpius axillares folio subtendente perfecto, inferiores interdum more *S. minoris*

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* 1589 D. est *Celtis Wightii*, 4455 A. est *Strychnos nux-vomica*.

oppositifolii, nonnulli etiam in ramulos foliiferos abeunt. Flores fere *S. minoris*, sed semper pentameros vidi.

Hab. In montibus Khasia (*Wall.* Cat. n. 1587, *Griffith*, *Hook. fil.* et *Thomson*).

5. S. PANICULATA, *Champ.*, Benth. in Kew Journ. Bot. vol. v. p. 57, glabra, subscandens, ecirrhosa?, foliis ovatis, paniculis thyrsoideis plerisque terminalibus folio longioribus, pedicellis calyce multo longioribus, floribus tetrameris, corollæ tubo laciniis multo breviore.—Antheræ filamento suo æquilongæ basi parcè ciliatæ.

Hab. In ins. Hong Kong (*Champion*).

6. S. MULTIFLORA, glabra, subscandens?, ecirrhosa?, foliis amplis ovatis ellipticisve, paniculis folio sublongioribus laxè floribundis, pedicellis calyce sublongioribus, floribus pentameris, corollæ tubo lacinias æquante.—Ramuli læves. Folia 4–8 poll. longa, 2–4 poll. lata, breviter et obtusè acuminata, quintuplinervia, petiolo 3–4-lineari. Inflorescentia ferè *S. paniculatæ* sed pedicelli proportione breviores. Flores majores, semper pentameri. Corollæ tubus 1½ lin., laciniæ 1¼ ad 1½ lin. longæ, basi barbatæ. Antheræ imberbes. Ovarium villosum. Stylus elongatus. Bacca globosa oligosperma, maturam non vidi. Affinis *S. laurinæ*. Folia latiora. Corollæ majores laciniis longioribus.

Hab. In ins. Philippinis (*Cuming*, n. 641, 695, 1059 & 1482).

7. S. LAURINA, *Wall.*, A. DC. Prod. vol. ix. p. 13, glabra, subscandens, cirrhis bifidis, foliis ovali-ellipticis oblongisve subacuminatis 3–5-plinerviis, paniculis axillaribus folio brevioribus, terminalibus amplis multifloris, floribus pentameris, corollæ tubo laciniis paullo longiore.—Folia 4–6-pollicaria. Paniculæ puberulæ. Pedicelli ultimi abbreviati. Corollæ tubus 1½ lin. longus, supernè latior, laciniæ vix lineam longæ, densè barbatæ. Ovarium villosum. Bacca parva videtur, sed in specimine immatura.

Hab. Tavoy (*Gomez*), Mergui (*Griffith*).

8. S. ANGUSTIFLORA, glabra, scandens, cirrhis simplicibus apice incrassatis, foliis ovato-acuminatis orbiculatisve, cymis terminalibus pedunculatis laxis folio brevioribus pubescentibus, floribus pentameris, corollæ tubo laciniis elongatis sublongiore.—Folia parva, raro 2 pollices excedentia, latitudine quam maximè varia. Cymæ iis *S. Nux-vomicæ* minores. Calyx minimus. Corolla 4 lin. longa; laciniæ basi intus villosæ, angustiores et longiores quam in omnibus mihi notis speciebus. Ovarium et stamina glaberrima. Bacca globosa.

Hab. In ins. Hong Kong (*Hinds*, *Champion*, planta a me olim dubitanter ad *S. colubrinam* relata).

9. S. WALLICHIANA, *Steud.*, DC. Prod. vol. ix. p. 13, glabra, foliis ovato- v. oblongo-ellipticis longè acuminatis triplinerviis, cymis densis multifloris folio brevioribus, corollæ pentameræ tubo tenui laciniis intus basi villosis 4–5-plo longiore.—Folia pleraque sub-5-pollicaria basi in petiolum brevem angustata, acumine abrupto semi-pollicari; in speciminibus nonnullis occurrunt latiora brevius acuminata ferè *S. ovalifoliæ*. Pedunculi axillares v. terminales, apice trichotomi, cymis ultimis subcapitatis. Corollæ tubus 4–5 lin. longus, laciniæ vix lineam. Antheræ subexsertæ, glabræ v. basi

pilis paucis ciliatæ. Ovarium glabrum; dissepimentum crassiusculum; placentæ peltatæ ovulis plurimis semi-immersis.

Hab. In montibus Khasia (*H. Bruce*, *Simons*).

10. *S. Tieute*, Blume, Rumphia, vol. i. t. 24, species Moluccana scandens, longiflora, fauce nuda, mihi ignota.

11. S. OVALIFOLIA, *Wall.*, DC. l. c. vol. ix. p. 13, scandens, cirrhosa, glaberrima, foliis ovatis ellipticisve obtusè acuminatis triplinerviis, paniculis axillaribus pedunculatis laxis folio subbrevioribus, floribus pentameris, corollæ imberbis? tubo laciniis pluries longiore.—*S. Wallichianæ* affinis, folia plerumque latiora, magis coriacea, venis transversis minus conspicuis. Inflorescentia laxior. Pedicelli calyce longiores. Flores in speciminibus meis nimis juveniles non ritè examinare potui, sed corolla intus glabra videtur. Tubus certe ut in *S. Wallichiana* elongatus.

Hab. In ins. Penang (*Wallich*).—*S. acuminata*, Wall., DC. l. c. p. 14, e Amherst et Chappedong videtur eadem species, sed flores et fructus desunt.

12. *S.* species, scandens, cirrhifera ex Africa tropica occidentali, floribus ignotis non definienda.

** ARBORESCENTES, *a longifloris ad brevifloras ordinatæ.*

13. S. NUX-VOMICA, *Linn.*, DC. l. c. p. 15, arborescens, foliis petiolatis ovatis 3–5-plinerviis glabris, corymbis terminalibus, corollæ imberbis tubo laciniis 3–4-plo longiore.—*S. ligustrina*, Blume, Rumphia, vol. i. p. 68. t. 25, ex ic. et descr.

Hab. Species ad oras Indiæ orientalis in ins. Ceylon et in Moluccis vulgaris.

14.? *S. lucida*, Br., DC. l. c. p. 16, ex Australia tropica, mihi ignota.

15. S. POTATORUM, *Linn. fil.*, DC. l. c. p. 15, arborescens, foliis brevissimè petiolatis ovatis oblongisve sub-5-plinerviis glabris, cymis ad ramos annotinos brevibus, floribus pentameris, calycis laciniis acuminatis, corollæ tubo laciniis paullo longiore, fauce villosissima.—Iconibus citatis adde *Wight Illustr.* vol. ii. t. 156. Corollæ tubus 1½ lin. longus.

Hab. In India orientali frequens, in Peninsula (*Wight*), Behar (*Hook. fil.*), Prome (*Wallich*).

16. S. UNGUACHA, *A. Rich.*, Walp. Rep. vol. iii. p. 72, arborescens, foliis petiolatis ovatis oblongisve glabris, cymis ad ramos annotinos brevissimis densis, floribus plerisque tetrameris, calycis laciniis suborbiculatis, corollæ tubo laciniis incrassatis sublongiore, fauce breviter villosa.

Hab. In Abyssinia (*Schimp.* Ser. 3. n. 1817) et forte eadem species floribus 4–5-meris, in Senegambia (*Heudelot*, n. 801).

17. *S. Lokua*, A. Rich., Walp. l. c., ex Abyssinia, a me non visa. Ex charactere differre videtur a præcedente pube, a sequente foliorum forma. Flores ignoti sunt.

18. S. DYSOPHYLLA, arborescens, foliis petiolatis obovatis orbiculatisve utrinque velutino-pubescentibus, cymis ad ramos annotinos brevissimis densis, floribus tetrameris, calycis laciniis suborbiculatis, corollæ tubo laciniis in-

crassatis sublongiore, fauce breviter villosa.—An *S. Unguachæ* var. insignis, foliis utrinque densè molliterque pubescentibus?

Hab. In Africa austro-orientali subtropica ad sinum Delagoa (*Forbes*).

II. Species Americanæ.

* *Longifloræ arborescentes.*

19. *S. pseudochina*, A. de St. Hil.; A. DC. Prod. vol. ix. p. 14.—Frequens in campis altis prov. Minas Geraes et Goyaz (*Gardner*, n. 4273 & 5007, *Pohl*, *Claussen*, *Martius*, &c.).

20. *S. triplinervia*, Mart.; A. DC. l. c.—*S. Gomeziana*, Casar. Stirp. Nov. p. 14; Walp. Rep. vol. vi. p. 497. Prope Rio Janeiro (*Gardner*, *Tweedie*, *Gomez*, &c.).

** *Longifloræ scandentes vulgo cirrhiferæ.*

21. S. RONDELETIOIDES, *Spruce*, scandens, glabra, foliis ovatis oblongisve breviter acuminatis coriaceis, cymis paniculatis terminalibus, pedicellis brevibus, corollæ pulveraceo-tomentellæ tubo laciniis duplo longiore.—Frutex altè scandens, cirrhis simplicibus incrassato-dilatatis. Folia superiora circa 3 poll. longa, 1½ poll. lata, basi rotundata; inferiora sæpè semipedalia, circa 2 poll. lata, basi angustata; omnia demum coriacea, 3–5-plinervia, supra nitida, subtus pallida, petiolo 3–4-lineari. Paniculæ foliis superioribus vix longiores, ramis oppositis, floribus ad apices ramulorum confertim cymosis suaveolentibus. Calyces sessiles v. breviter pedicellati, parvi, laciniis latè triangularibus acutis apice sæpè recurvis. Corollæ ochroleucæ tubo 3 lin. longo, laciniis 1½ lin. lanceolatis obtusiusculis intus basi lanatis. Stamina infra apicem tubi inserta, glabra; antheræ oblongæ, apiculatæ. Ovarium glabrum, dissepimento tenui. Ovula pauca. Stylus exsertus, stigmate capitato.

Hab. Frequens in "gapo" ad Rio Uaupès ubi Uirarì-rána vocatur (*Spruce*, n. 2419).

22. S. TOXIFERA, *Schomb.*, DC. Prod. vol. ix. p. 16, scandens, pilis longis rufis patentibus hirsutissima, foliis ovatis v. oblongo-ellipticis acuminatis membranaceis, cymis paucifloris subcapitatis terminalibus, corollæ hirsutissimæ tubo laciniis 3–4-plo longiore.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 1. n. 155, coll. 2. n. 770; *Rich. Schomb.* n. 1465). Confer *Schomb.* in Ann. Nat. Hist. vol. vii. p. 411, t. 12 & 13; *Hook.* Ic. t. 364; *Walp.* Ann. Bot. vol. i. p. 512.

23. S. TOMENTOSA, scandens, foliis ovatis oblongisve supra adpressè hirtellis subtus ramulisque rufo-tomentosis, cymis terminalibus confertim paucifloris, corollæ hirsutissimæ tubo laciniis subtriplo longiore.—Rami juniores tomentosi, demum glabrati. Folia breviter petiolata, in speciminibus suppetentibus 1–2 poll. longa, obtusa v. acuta, basi rotundata, 5- v. ferè 7-nervia, pilis paginæ superioris brevibus appressis, tomento inferioris denso molli. Inflorescentia fere *S. toxiferæ* sed laxior. Calycis laciniæ dimidio breviores, ovato-acuminatæ. Corolla ferè *S. toxiferæ*, sed in speci-

minibus paucæ nondum apertæ. Antheræ ut in illa ovato-oblongæ obtusæ vix apiculatæ. Ovarium glabrum, dissepimento tenuissimo.

Hab. In Guiana anglica, in montibus Roraima (*Rob. Schomb.* coll. 2. n. 723; *Rich. Schomb.* n. 1075).

24. *S. brachiata*, Ruiz & Pav., A.DC. Prod. vol. ix. p. 15, e Peruvia, a me non visa.

25. S. SMILACINA, glabra, foliis (amplis) ellipticis oblongisve coriaceis, cymis axillaribus brevissimis paucifloris v. secus ramulos axillares aphyllos folio breviores oppositis, calycis laciniis orbiculatis obtusis, corollæ pentameræ punctato-tomentellæ tubo laciniis plus duplo longiore.—Folia semipedalia v. longiora. Flores nunc in axillis 3–5 fasciculati breviter pedicellati, nunc sæpius in cymulas breves oppositas dispositi, paniculam axillarem racemiformem constituentes. Corollæ tubus 3 lin. longus, laciniæ vix linea longiores, obtusæ, intus basi parcè piloso-lanatæ.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 2. n. 775, *Rich. Schomb.* n. 1516), Cayenne (*Martin*).

26. S. GARDNERI, *A. DC.* Prod. vol. ix. p. 14. Frutex scandens hinc inde cirrhifer, nec arbor. Flores pentameri, corollæ tubo punctato-tomentello laciniis duplo longiore.

Hab. In prov. Goyaz Brasiliæ, in sylvis prope Arrayas (*Gardner*, n. 3890), et ut videtur eadem in Guiana anglica ad flumen Corentyne superius (*Rob. Schomb.* specimen unicum).

27. S. PEDUNCULATA; *Rouhamon pedunculatum*, A. DC. Prod. vol. ix. p. 561. Frutex scandens, præcedenti similis, sed flores tetrameri, corollæ tubo laciniis vix dimidio longiore.

Hab. In montibus Roraima Guianæ anglicæ (*Rob. Schomb.* coll. 1. n. 482 & 792).

28. S. DARIENENSIS, Seem. Bot. Herald, p. 166.—Præcedentibus affinis et præsertim sequenti simillima. Folia tamen basi angustata nec ut in sequente rotundata. Flores non vidi. Secundum Seemann glabri sunt. An *S. cogentis* varietas?

Hab. In maritimis ins. Coyba et oræ Darienensis Americæ centralis (*Seemann*).

29. S. COGENS, *Schomb.*, DC. Prod. vol. ix. p. 16.—In specimine Schomburgkiano ramuli steriles pubescentes sunt, folia sæpius glabra; in Spruceanis ad eandem ut videtur speciem pertinentibus rami fructiferi glabri, paniculæ axillares, oblongæ, 1–2-pollicares, a basi ramosæ. Calycis laciniæ 5, parvæ, lanceolatæ, acutæ. Baccæ globosæ, flavescentes, seminibus 1–2 orbiculatis. Corollæ desunt.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 1. n. 156). In "gapò" ad Rio Uaupès (*Spruce*, n. 2634) et specimen defloratum e Cayenna (*Martin*) huc etiam pertinere videtur.

30. S. LANCEOLATA, *Spruce*, scandens, ramulis hirtellis, foliis oblongo-lanceolatis acutis, cymis abbreviatis axillaribus, corollæ tubo laciniis densissimè lanatis vix longiore.—Cirrhi supernè demum valdè incrassati. Folia brevissimè petiolata, circa 2 poll. longa, 6–9 lin. lata, in specimine fructifero 3 poll. longa, 1 poll. lata, 3–5-plinervia, subtus ad axillas costarum barbata,

costis minutè puberulis, cæterum glabra. Cymæ laxæ, subsessiles, glabræ, pedicellis 1–2 lin. longis. Flores ochroleuci, suaveolentes, pentameri. Calyces glabri, laciniis breviter lanceolatis acutis. Corolla ferè *S. Rouhamon* sed tubus 1½ lin. longus; laciniæ lanceolatæ vix breviores, lana interiore nivea densissima. Stamina ad faucem inserta; filamenta complanata, ad medium laciniarum attingentia; antheræ parvæ, ovatæ. Ovarium glabrum, carnosulum, dissepimento crassiusculo. Bacca flavescens, hinc planiuscula illinc convexa (loculo uno abortiente?). Semina 1–2.

Hab. In "gapò" ad ostium fluminis Uaupès et ad cataractas San Gabriel ad Rio Negro (*Spruce*, n. 2084 & 2375).

*** *Breviflora* (*corollæ tubo laciniis breviore*) *cymis axillaribus*.

31. **S. Rouhamon**, fruticosa, subcirrhifera, foliis ellipticis obovatis oblongisve basi angustatis subtus ad venas ramulisque tomentellis, cymis axillaribus brevibus, floribus 4–5-meris, corollæ tubo laciniis intus densissimè lanatis breviore.—*Rouhamon guianense*, Aubl., DC. Prod. vol. ix. p. 17.—*R. divaricatum*, DC. l. c.

Hab. In Guiana anglica et gallica.

32. S. SUBCORDATA, *Spruce*, scandens, cirrhifera, ramulis hirtis, foliis subsessilibus ovato-lanceolatis basi plerisque cordatis subtus ad venas pubescentibus, cymis brevissimis axillaribus laxè 3–5-floris, floribus plerisque tetrameris, corollæ tubo brevi.—Frutex scandens. Folia majora bipollicaria, pollicem lata, acutiuscula, inferiora breviora et latiora, ramealia multo angustiora, ferè omnia basi cordata, consistentia papyracea v. demum coriacea. Calycis laciniæ parvæ, hirtellæ. Corollam nonnisi emarcidam vidi. Bacca cerasiformis, viridis, 1–2-sperma.

Hab. In sylvis ad Barra do Rio Negro (*Spruce*, n. 1237).

33. S. BREVIFOLIA, *Spruce*, scandens, cirrhosa, ramulis pubescentibus, foliis subsessilibus cordato-ovatis subtus vel utrinque hirtellis, floribus axillaribus 1–3-nis subsessilibus plerisque tetrameris, corollæ tubo brevissimo.—Affinis *S. subcordatæ*. Folia vix unquam pollicem longa. Flores minores pedicellis subnullis. Calyces tamen majores et ferè glabri. Baccam non vidi. Flores ex *Spruce* ochroleuci suaveolentes.

Hab. In "Capoeiras" ad ostium flum. Uaupès (*Spruce*, n. 2087.)

34.? *S. Mitscherlichii*, Schomb.; Walp. Ann. vol. i. p. 512.—In Guiana anglica (*Rich. Schomb.*). Species a me non visa.

35.? S. HIRSUTA, *Spruce*, arborescens, pilis longis rufis patentibus hirsuta, foliis amplis oblongo-ellipticis acuminatis, floribus axillaribus sessilibus glomeratis pentameris, calycis laciniis lanceolatis hirsutis.—Arbor gracilis 20-pedalis (ex *Spruce*). Ramuli, costæ paginæ inferioris foliorum, calyces et bracteæ rufo-hispidi. Folia semipedalia, ferè sessilia, basi rotundata, apice longè et angustè cuspidata, 5-nervia, papyracea, supra glaberrima. Flores in axillis (uti de *S. Mitscherlichii* prædicatur) densè aggregati, bracteis lanceolatis acutis calyces superantibus. Calyx 1½ lin. longus. Corollam non vidi. Ovarium apice pilosum, biloculare, ovulis paucis. Bacca glabra, oblonga, apice obliqua, semipollicaris, abortu monosperma.

Hab. In sylvis umbrosis Managuiry ad Rio Negro (*Spruce*).

36. S. PARVIFLORA, *Spruce*, foliis amplis oblongo-ellipticis glabris, cymis axillaribus paniculatis multifloris, floribus minimis pentameris, corollæ canescentis tubo brevissimo laciniis crassis medio lanatis.—Species inflorescentia distinctissima, flores parvi sequentium. Frutex est altè scandens. Ramuli tomento minutissimo flavicantes, demum glabri. Folia breviter petiolata, usque ad 8–10 poll. longa, 3–4 poll. lata, apice acuminata, basi cuneato-rotundata, demum crasso-coriacea, costis subtus elevatis. Paniculæ vel axillares vel ad basin innovationum oppositæ foliis floralibus abortientibus, pedunculatæ, trichotomæ, floribundæ, cymis ultimis densis. Flores in cymulis sessiles, suaveolentes, virentes, siccitate canescentes, vix lineam longi. Calyx minutus, laciniis latis obtusis ciliolatis. Corollæ tubus omnium brevissimus, staminibus versus basin affixis; laciniæ crassæ, intus breviter lanatæ. Ovarium glabrum, stylo brevi.

Hab. In "gapò" ad Rio Uaupès (*Spruce*, n. 2482).

**** *Breviflora (corollæ tubo brevissimo) cymis terminalibus.*

37. S. MARGINATA, suffruticosa, glaberrima, foliis ovatis orbiculatisve obtusissimis margine incrassatis, cymis terminalibus corymbosis, floribus 4–5-meris, corollæ extus glabræ tubo brevissimo.—Suffrutex 1–2-pedalis. Folia rigida 5-plinervia, venosa, basi apiceque obtusissima v. retusa, petiolo vix lineam longo. Cymæ nunc paucifloræ subsimplices, nunc multifloræ in paniculam seu corymbum basi trifidum dispositæ. Pedicelli brevissimi. Calyces parvi, lobis acutis. Corolla 1½ lin. longa, alba, laciniis intus villoso-lanatis.

Hab. In collibus arenosis Missionum Duro prov. Goyaz (*Gardner*, n. 3322, caule bipedali foliis 1–1½-pollicaribus) et ad Chapada da Mangabeira ejusdem provinciæ (*Gardner*, n. 3323, caule pedali foliis semipollicaribus sed inflorescentia vix evoluta).

38. S. BRASILIENSIS, *Mart.*, subarborescens, ramulis puberulis rarius glabratis, foliis ovatis submembranaceis v. tenuiter coriaceis margine tenui, cymis corymbosis terminalibus paucifloris, floribus pentameris, corollæ tubo brevissimo, laciniis medio barbatis.—Arbor parva (sub-15-pedalis) interdum spinis cirrhisve axillaribus hinc inde armata. Folia 1–1½ v. rarius 2 poll. longa, acuta v. obtusa basi rotundata v. angustata. Flores vix 1½ lin. longi. Baccæ cerasiformes aurantiacæ v. flavescentes, 1–2-spermæ.—Varietates tres vidi: *α, normalis,* glabriuscula sæpè floribunda axillis sæpè spiniferis; *S. brasiliensis* et *S. breviflora,* DC. Prod. vol. ix. p. 15. Prope Rio Janeiro præsertim in monte Corcovado (*Sello, Lhotsky, Gomez,* &c.).—*β, minor*, puberula, foliis minoribus, floribus paullo majoribus, inflorescentia densiore, ramulis hinc inde apice spinescentibus axillis nonnunquam cirrhiferis. In Serra Acurua prov. Bahia (*Blanchet,* n. 2792), ad Rio Tapajoz prope Santarem (*Spruce*, n. 704).—*γ, rigida,* ramulis evidentius tomentosis, foliis subtus plus minus hirtellis. In campis apertis montosis prope San Antonio (*Gardner*, n. 2085).

39. *S. rubiginosa*, DC. Prod. vol. ix. p. 16. Frutex v. arbor 6–20-pedalis. Flores vix linea longiores, pentameri. Ad Rio San Francisco (*Blanchet*, n. 2918), in districtu Paranagoa, prov. Piauhy (*Gardner*, n. 2660 & 2661).

40. S. CASTELNÆI, *Wedd.* in Castelnau Expéd. Amér. Sud, vol. v. p. 22, scandens, ecirrhosa, ramulis ferrugineo-villosis foliis elliptico-oblongis membranaceis nervis subtus ferrugineo-pilosis, cymis corymbosis terminalibus multifloris ferrugineo-tomentosis, corollæ tubo brevi laciniis apice barbulatis.—Caules altè scandentes demum glabrati. Folia palmaria, acuminata, nitidula glabraque v. puberula, nervis supra pubescentibus imprimis subtusque ferrugineo-pilosis; floralia pollicaria, bracteæformia, basi incrassata et reticulata. Cymæ vix bipollicares in ramulis annuis terminales. Calyces bracteis nonnullis linearibus involucrati, lobis obtusis. Corolla inconspicua, breviter infundibuliformis, ad faucem nuda. Antheræ basi barbellatæ. (Descr. ex Weddel. l. c. et vidi specim. in herb. Mus. Par.)

Hab. Ad ripas fluminis Amazon inter flumina Ucayala et Tabatinga (*de Castelnau*).

Species non satis notæ sunt:—

S. Ignatia, Juss. Semina a Gærtnero aliisque depicta ad *Strychnum* quendam (an *S. multifloram*?) ex ins. Philippinis pertinent. Flores a Linnæo filio sub nomine *Ignatiæ amaræ* descripti, *Posoqueriam longifloram* e Guiana referrunt.

S. farinosa, Blume.—DC. Prod. vol. ix. p. 16, e Madagascaria.

S. innocua, Delile.—DC. l. c. e Nubia.

S. Curare, H. B. K.—*Rouhamon*? *Curare*, A. DC. Prod. vol. ix. p. 17.

S. Panamensis, Seem. Bot. Herald, p. 166.

Species excludendæ:—

S. grandis, Wall. = *Anisophyllum grande.*

S. 5500 Wall. Cat. Planta dubia, certè non hujus ordinis.

S. oblongifolia, Hochst. = *Carissa oblongifolia.*

S. scandens, Schum. & Thonn. = *Apocynea*?

XX. BREHMIA, *Harv.*, A. DC. Prod. vol. ix. p. 19.

Species unica:—

B. spinosa, Harv.; A. DC. l. c.—In Madagascaria, Africa austro-orientali et tropica usque ad Senegambiam (*Heudelot*).

XXI. LABORDEA, *Gaud.*, A. DC. Prod. vol. ix. p. 21.

Species unica:—

L. fagroidea, Gaud.; DC. l. c.—In ins. Sandwichensibus. A me non examinata.

XXII. NICODEMIA, *Ten.* Cat. Hort. Napol. p. 88.

Species sunt:—

1. *N. diversifolia*, Ten. l. c.; Walp. Ann. vol. i. p. 531.—*Buddleia diversifolia*, Lam.; Benth. in DC. Prod. vol. x. p. 445.—In ins. Mauritio et Madagascar.
2. *N. rondeletiæflora.*—*Buddleia rondeletiæflora*, Benth. l. c. p. 445.—In ins. Johanna Comores.

XXIII. GARDNERIA, *Wall.*, DC. Prod. vol. ix. p. 19.

Species sunt:—

1. G. OVATA, *Wall.*, DC. l. c. p. 20, pedunculis trifidis trichotomisve, corollæ lobis obtusis, antheris connatis, ovarii loculis uniovulatis.—Wall. Pl. As. Rar. vol. iii. t. 231.—*G. Wallichiana*, Wight in Wall. Pl. As. Rar. vol. iii. t. 281; Wight, Ic. t. 1313.

Hab. In montibus Khasia (*M. R. Smith*, *Griffith*, *Hook. fil. & Thoms.*); in montibus Peninsulæ Indiæ Orientalis (*Wight*, *Gardner*, *Schmidt*, *Hohenacker*, n. 1445, sub nom. Ardisiaceæ tetrameræ).

2. G. ANGUSTIFOLIA, *Wall.*, DC. l. c., pedunculis unifloris recurvis rarissimè bifloris, corollæ lobis acuminatis, antheris liberis, ovarii loculis collateraliter biovulatis.—*G. nutans*, Sieb. & Zucc. Fam. nat. Fl. Jap. pars 2. p. 41.

Hab. In jugo Himalaico, in Napalia (*Wall.*), in Kemaon (*Madden*, *Strachey & Winterbottom*), in montibus Sikkim (*Hook. fil.*) et Khasia (*Hook. fil. & Thoms.*), et in Japonia (*Siebold*).

XXIV. PAGAMEA, *Aubl.*, DC. Prod. vol. ix. p. 19.

Flores sæpè polygamo-dioici. Ovarium perfectum, biloculare; ovula in loculis solitaria, e basi erecta. Bacca seu drupa nigra v. virescens, dipyrena, pyrenis crustaceis v. ferè osseis, intus planis, dorso convexis. Semen erectum, testa tenui, albumine cartilagineo sulcato-runcinato. Embryo parvus, subteres, prope basin albuminis erectus, radicula recta, cotyledonibus æquilonga.

Species sunt:—

1. P. CAPITATA, foliis ovato-lanceolatis acuminatis margine revolutis subtus inflorescentiaque hirtellis, florum glomerulis ad apicem pedunculi capitatis bracteatis.—Partes juniores pilis brevibus mollibus hirtæ et ut videtur viscidulæ. Stipulæ quam in cæteris Pagameis breviores et diutius persistentes; vaginæ vix 2 lin. longæ, dentes breves. Folia forma ferè *P. guianensis*, sed magis acuminata, rigidiora, 2–2½ poll. longa, supra nitidula, margine in sicco semper revoluta, venis primariis secus costam utrinque 4–6 prominulis subplicata. Pedunculi compressi, foliis breviores, capitulo denso depresso, bracteis linearibus foliaceis sæpius 2–4 flores superantibus. Flores tetrameri. Corollæ lobi intus ferè glabri. Stylus bifidus.

Hab. In Guiana anglica (*Rob. Schomb.* coll. 2. n. 578; *Rich. Schomb.* n. 870) et in Surinama (*Hostmann*, n. 801).

2. P. PLICATA, *Spruce*, foliis (amplis) ovali-ellipticis subtus molliter pubescentibus, venis primariis valdè prominentibus, florum glomerulis interruptè spicatis.—Arbor 30-pedalis. Stipulæ elongatæ. Folia 6–8 poll. longa, 3–4 poll. lata, petiolo triquetro sæpè ultra pollicem longo, supra glabra, subtus canescentia, inter costas insigniter plicata, præsertim in vivo teste Spruceo. Pedunculi 2–4-pollicares, valdè compressi, uti calyces leviter puberuli. Inflorescentia *P. guianensis*, sed flores et fructus majores; corollas tamen non vidi.

Hab. In campo quodam arenoso parvo prope San Gabriel do Cachoeiras ad Rio Negro Brasiliæ septentrionalis detexit *R. Spruce*.

Var. *β*. glabrescens, foliis subtus parcè villosis. Corollæ tubus brevis, laciniæ intus breviter paleaceo-villosæ. In Brasiliæ prov. Pernambuco ad Rio Preto legit *G. Gardner*, n. 2891.

3. P. GUIANENSIS, *Aubl.*, DC. Prod. vol. ix. p. 19, glabra, foliis ovato-lanceolatis oblongisve planis, florum glomerulis interruptè spicatis, corollæ lobis intus paleaceo-villosissimis.—Frutex v. arbor parva 6–15-pedalis. Folia 1½–2 rarius 3 poll. longa. Flores albi. Baccæ demum nigricantes.

Hab. Frequens in Guiana anglica et gallica, in Surinama et in Brasilia boreali usque ad Bahiam.

4. P. SESSILIFLORA, *Spruce*, glabra, foliis oblongo-lanceolatis planis, florum glomerulis inter folia suprema arctè sessilibus, corollæ lobis intus villosis.—Arbor parva, ramosissima, 6–15-pedalis. Folia quam in *P. guianensi* minora, apice basique angustata. Stipulæ latæ, membranaceæ, caducissimæ. Flores magnitudine *P. guianensis*. Calycis margo 4–5-dentatus. Corolla pallidè virens, villis quam in *P. guianensi* brevioribus. Baccæ ovoideo-globosæ, non didymæ. Semina profundè sulcato-rugosa.

Hab. In sylvis humilioribus prope San Carlos do Rio Negro (*Spruce*).

5. P. THYRSIFLORA, *Spruce*, glabra, foliis ovato-lanceolatis oblongisve planis, florum glomerulis pedunculatis thyrsoideo-paniculatis, corollæ lobis intus brevissimè paleaceo-hirtis.—Arbor 6–15-pedalis, densè ramosa, in omnibus *P. guianensi* similis, nisi inflorescentia laxa, interdum ferè corymbosa, glomerulis inferioribus longiusculè pedunculatis et floribus (albis) minoribus corollæ lobis intus paleis brevissimis candidis nec pilis longis paleaceis obtectis. Stylus semibifidus. Baccæ quam in *P. guianensi* minores, obovoideo-globosæ nec didymæ. Semina hemisphærica, intus profundè bisulcata, dorso leviter corrugata.

Hab. In sylvis humidis prope San Carlos do Rio Negro (*Spruce*).

6. P. MACROPHYLLA, *Spruce*, glabra, foliis amplis ovali- vel oblongo-ellipticis breviter acuminatis, panicula ramosa petiolum vix superante, corollæ lobis intus densè villosis.—Arbor 15–20-pedalis, ramulis crassiusculis. Folia 6–8 poll. longa, 3–4 poll. lata, basi in petiolum sesquipollicarem angustata, subcoriacea, plana, glabra at opaca, subtus punctis lepidotis minutis creberrimis pallida; costa venisque primariis utrinsecus 8–9 subtus prominentibus. Stipulæ 1½–2-pollicares, acuminatæ, connatæ, superiores circa inflorescentias juniores medio inflatæ, membranaceæ, mox rumpentes et subcalyptratim deciduæ, basibus latis irregulariter truncatis persistentibus. Paniculæ in axillis supremis oppositæ, petiolo paullo longiores v. subbreviores, trichotomæ, densifloræ, rhachide compressa. Flores ad apices ramulorum brevium conferti, sessiles. Calyx cupuliformis, truncatus, tubo basi breviter carnoso, ovario pulvinato. Ovula in floribus a me examinatis minuta ut videtur abortiva. Corolla virescens, 4-fida, lobis intus densissimè paleaceo-pilosis.

Hab. Frequens in sylvis *Caa-tingas* dictis prope Panurè ad Rio Uaupès (*Spruce*).

7. P. CORIACEA, *Spruce*, glabra, foliis (amplis) ovali- v. oblongo-ellipticis coriaceis, paniculis folia subæquantibus, florum glomerulis secus ramos paniculæ interruptè spicatis.—Arbor gracilis 20–50-pedalis. Ramuli virides,

medulla ex Spruceo hexagona. Folia longè petiolata, subsemipedalia, in vivo crassa et viridia, venis vix prominulis. Stipularum vaginæ pollicares v. longiores, dentibus brevibus. Inflorescentiæ albidæ, subcarnosæ, folia breviter superantes, pedunculo compresso supra medium ramoso, glomerulis secus ramos sessilibus. Flores *P. guianensis*, albi, pili tamen loborum corollæ multo breviores. Stylus vix ad medium bifidus. Fructus *P. guianensis*, v. paullo major, apice emarginatus v. subdidymus.

Hab. In campis ad Rio Negro prope cataractas San Gabriel et ad Uananaca, necnon ad ripas fluminis Orenoco prope Esmeralda frequens (*Spruce*).

8. P. HIRSUTA, *Spruce*, undique pilis longis hirsuta, foliis amplis oblongo-ellipticis, florum glomerulis secus pedunculum paucis, summis sessilibus infimis breviter pedunculatis.—Folia petiolata, magnitudine *P. coriaceæ* et *P. plicatæ*, sed utrinque uti ramuli stipulæ et inflorescentiæ pilis longis subrufis patentibus hirsuta. Stipulæ sesquipollicares, connatæ, rufo-villosæ, caducissimæ. Pedunculi oppositi, folio breviores, ancipites. Capitula in parte superiore 3–5, summo terminali, pari superiore sessili, inferiore utrinque pedunculato. Calyx breviter hispidus, limbo brevi cupulato integro. Corollæ tubus duplo longior, laciniæ angustæ, acutæ, extus hispidæ, intus pilis brevibus paleaceis vestitæ. Fructus *P. coriaceæ*, subdidymus.

Hab. In sylvis humilioribus ad flumen Guiaina seu Rio Negro superius, et prope San Carlos do Rio Negro (*Spruce*).

XXV. GÆRTNERA, *Lam.*, DC. Prod. vol. ix. p. 32; Blume, Mus. Bot. p. 173.

Sect. I. ÆTHEONEMA, *DC.*—Calyx amplus coloratus limbo campanulato.

Species unica:—

1. *G. calycina*, Boj. in DC. Prod. vol. ix. p. 35.

Sect. II. EUGÆRTNERA, *DC.*—Calyx parvus, limbo patente v. subcampanulato. Corollæ tubus elongatus intus nudus v. intra stamina leviter villosus.

2–14. Species 13 Mascarenses in 'Prodromo' enumeratæ cum sequentibus duabus Ceylonensibus.

15. G. ROSEA, *Thwaites*, foliis ovatis lanceolatisve acutè acuminatis, stipulis biaristatis, floribus ternis sessilibus, calyce truncato 5-dentato, corollæ tubo elongato intus leviter villoso, filamentis anthera longioribus medio tubo insertis.—Frutex dichotomè ramosus. Folia sub-bipollicaria. Vaginæ stipulares breves, aristis brevioribus longioribusve. Corollæ roseæ, 8–9 lin. longæ. Bacca subdrupacea, basi contracta.

Hab. In ins. Ceylon (*Walker*, *Thwaites*).

16. G. WALKERI, *Wight*, Illustr. vol. ii. t. 156, foliis oblongis lanceolatisve acutè acuminatis, panicula pauciflora, pedicellis elongatis, corollæ tubo elongato intus villosulo, filamentis anthera sublongioribus medio tubo insertis.

Hab. In ins. Ceylon (*Walker*, *Gardner*, n. 581).—Ejusdem var. *angustifolia*, foliis angustè lanceolatis linearibusve, pedicellis 1–3-nis, dentibus calycinis angustioribus. In ins. Ceylon (*Walker*, *Thwaites*, n. 363, 440 & 457).

Sect. III. SYKESIA.—Calyx *Eugærtneræ.* Corollæ tubus lobis brevior v. vix longior, ad faucem intus villosus.

17. G. PANICULATA, *Benth.* in Hook. Fl. Nigr. p. 459, foliis (amplis) breviter petiolatis obovali-ellipticis oblongisve breviter acuminatis, vaginis stipulaceis apice aristato-dentiferis, panicula laxa trichotoma, corollæ lobis tubo subbrevioribus, antheris vix exsertis filamento suo longioribus.—Species *G. Kœnigii* arctè affinis. Flores numerosiores, minores, graciliores, calyx minus patens, et stipulæ aristatæ.

Hab. In Africa tropica occidentali ad Grand Bassa (*Vogel*).

18. G. KŒNIGII, *Wight,* Ic. t. 1318; Blume, Mus. Bot. p. 174, foliis (amplis) breviter petiolatis obovali-ellipticis oblongisve breviter acuminatis, vaginis stipulaceis integris v. obtusè dentatis, panicula laxè trichotoma, corollæ lobis tubo suo longioribus, antheris exsertis filamentis elongatis.—*Sykesia Kœnigii,* Arn., DC. Prod. vol. ix. p. 35.

Hab. In ins. Ceylon (*Walker, Gardner,* n. 582, &c.).

19. G. ACUMINATA, foliis oblongis acutè acuminatis, vaginis stipulaceis apice subaristato-dentiferis, panicula laxè trichotoma, corollæ lobis tubo subæquilongis, antheris vix exsertis filamento suo longioribus.—Valde affinis *G. Kœnigii* et fortè ejus varietas, folia angustiora longius et acutius acuminata, corollæ minores tubo tenuiore et filamenta multo breviora. Faux corollæ densè villosa.

Hab. In Singapore (*Wall.* Cat. n. 8342), et eadem species? in Borneo (*Lobb*).—An *G. Kœnigii, paniculata* et *acuminata* ad unam speciem pertinent ab Africa occidentali usque ad Moluccas diffusam?

20. G. THYRSIFLORA, *Blume,* Mus. Bot. p. 174, foliis oblongis acutè acuminatis, vaginis stipulaceis 2–4-aristatis, panicula laxè thyrsoidea pauciflora, corollæ tubo laciniis breviore, antheris exsertis, filamentis elongatis.—*Sykesia thyrsiflora,* Arn., DC. Prod. vol. ix. p. 35.—Drupa dipyrena, pyrenis chartaceis, facie plana. Semen semiglobosum, prope basin interiorem affixum. Testa venis ramosis leviter impressa. Albumen cartilagineum. Embryo prope basin albuminis rectum, cylindricum; radicula elongata ad hilum spectans; cotyledones breves conicæ.

Hab. In ins. Ceylon (*Walker,* et forte *Thwaites,* n. 288 sine fl.).

21. G. OXYPHYLLA, foliis oblongo-lanceolatis acutè acuminatis basi longè angustatis, vaginis stipulaceis subbiaristatis, panicula laxa pauciflora, corollæ tubo laciniis subæquilongo, filamentis brevibus (?).—*Psychotria oxyphylla,* Wall. Cat. n. 8374.—Specimina perpauca quæ vidi a *G. acuminata* differre videntur, foliis minoribus multo angustioribus et inflorescentia depauperata. Panicula trifida ramis subpollicaribus, terminali 5-7-floro, lateralibus trifloris.

Hab. In ins. Singapore (*Wallich*).

Since the publication of the first portion of this paper, I have received a detailed memoir on the same subject by M. Louis

Edouard Bureau, entitled "De la Famille des Loganiacées et des plantes qu'elle fournit à la médecine, Thèse pour le Doctorat en médecine." Paris, 1856, 4to, 150 pp. The medical properties of the drugs derived from the family are treated at great length, but there is also considerable space devoted to the systematic questions which are the subject of my own paper. M. Bureau has not had the same advantages as myself in the examination of so large a proportion of specimens, nor does he appear to have had the opportunity of consulting some of the more modern works excepting through Walpers's extracts, such, for instance, as Blume's "Museum Botanicum Lugduno-Batavum," but he has availed himself to the utmost of the materials he has had access to, and his analysis and descriptions are very careful and exact. He inclines to reject a considerable number of genera, referring them to their nearest allied families; that is, *Mitreola*, *Mitrasacme*, and *Polypremum* to *Rubiaceæ*; *Gelsemium* to *Apocyneæ*; *Fagræa*, *Potalia*, and *Anthocleista* to *Gentianeæ*; *Nuxia* and its allies to *Scrophularineæ*. For the reasons above given, I cannot concur in this course, unless indeed the whole order be broken up, and the two genera which M. Bureau considers as essentially typical, *Logania* and *Geniostoma*, be also rejected, the one to *Scrophularineæ*, the other to *Apocyneæ*.

M. Bureau's careful observations of the details of structure of such genera as he had specimens of to dissect, suggest a few additional notes which I shall place in the order above adopted.

MITREOLA, MITRASACME, and POLYPREMUM.

In dissecting the flowers at a very early stage, M. Bureau finds a very perceptible adherence of the ovary to the tube of the calyx, amounting in *Polypremum* to a fifth or nearly a fourth of the total height of the young ovary, and in *Mitreola* to nearly one-half in a very young state, although gradually disappearing as the ovary grows, and imperceptible when the capsule is ripe. This adherence, which some might be disposed to consider as the broad base of the ovary, always large in proportion to its height at an early stage, is, without doubt, indicative of a close affinity to *Rubiaceæ*, an affinity which must suggest itself to any one who studies the *Loganiaceæ*; but appears to me insufficient to establish identity, as it is no more than what is observable in numerous *Scrophularineæ*—in none more so than in *Calceolaria*, which can yet hardly be excluded from true *Scrophularineæ*.

GENIOSTOMA.

M. Bureau points out the curious expansions of the placenta in which the seeds are imbedded. Most probably in a fresh state they form a pulp filling the whole cavity of the fruit, assuming in desiccation the regular stellately-lobed form, described and figured by M. Bureau.

LABORDEA.

M. Bureau has been enabled to dissect three flowers of this plant. He confirms the presumed valvular æstivation of the corolla, but finds always two cells only to the ovary, as in the majority of *Loganiaceæ*, and very plausibly suggests that the three-celled one, examined by Gaudichaud, was an accidentally abnormal one. As the fruit is still unknown, there is nothing yet to indicate more exactly its proper place in the order.

GARDNERIA.

M. Bureau has dissected a flower of *G. ovata*, with ovary-cells and ovules very much larger in proportion to the ovary itself than I had succeeded in finding; possibly those I dissected may have been imperfect by abortion, or M. Bureau's flower may have belonged to the *G. angustifolia*, which is often much like *G. ovata* in foliage. I found the ovary of *G. angustifolia* very much like that figured p. 55 of M. Bureau's paper; but what he designates as a cupuliform arillus, was to my eyes a second ovule, collateral in attachment, but superposed by pressure, and often ripening into a second seed; for the fruit of *G. angustifolia* is more frequently tetraspermous than dispermous.

M. Bureau's woodcuts, comprising dissections of all the genera he has examined, are very accurate and well executed.

I take this opportunity of requesting the correction of two clerical or typographical errors in the first portion of this paper:—

Page 57, line 2 from the bottom, *for* stipules *read* petioles.
— 81, — 25, *for* exact *read* erect.

On some Collections of Arctic Plants, chiefly made by Dr. Lyall, Dr. Anderson, Herr Miertsching, and Mr. Rae, during the Expeditions in search of Sir John Franklin, under Sir John Richardson, Sir Edward Belcher, and Sir Robert M'Clure.

By J. D. HOOKER, Esq., M.D., F.R.S., F.L.S., &c.

[Read April 1st, 1856.]

ALTHOUGH the collections made during the later Arctic expeditions contain no novelty, they are, I think, worthy of publication;

both as important materials towards our knowledge of the geographical distribution of plants within the Polar Circle, and as records of the eminent services rendered to this branch of science, by the exertions of the officers of those expeditions, which have contributed so materially to the naval glory of the first half of the nineteenth century.

It is not my intention to do more here than place on record an account of the collections made by Dr. Lyall in Sir E. Belcher's expedition, by Dr. Anderson and Herr Miertsching in Sir R. M'Clure's, and by Mr. Rae after his detachment from Sir John Richardson's party on an exploring expedition from Great Bear Lake to the mouth of the Coppermine River, and to the south shores of Victoria Land. I restrict myself thus, because I hope at some future period to have the honour of laying before this Society a full account of the vegetation of the Polar Circle, embracing the discoveries of all our Arctic voyagers, as well as those of the Scandinavian and Russian naturalists in Greenland, North Europe, and Siberia. This, however, is a work demanding much time and study; my main object in attempting it being to trace the extra Polar distribution of the Polar species, to determine, if possible, the effects of climate upon them during various phases of their development, and to indicate some causes which may have contributed to determine their present distribution.

1. Dr. Lyall's plants, collected during Sir E. Belcher's expedition in 1852–4, in Disco and Whale Fish Islands, and Cape York (coast of Greenland); and in Lancaster Sound, Beechey Island, Wellington Channel, and Northumberland Sound, amongst the Polar islands.

Lat. 68° to 77° N.

Long. 50° to 95° W.

2. Dr. Anderson's and Herr Miertsching's collections from Banks' Land and the adjacent west coast of Prince of Wales Land, and Cape Bathurst, on the mainland to the southward of Banks' Land.

Lat. 70° to 74° N.

Long. 115° to 128° W.

3. Mr. Rae's collections, the chief interest of which is that they connect the latter with the vegetation of the mainland to the south-east, and with the southern shores of Prince Albert's Land, portions of which are called Victoria Land and Wollaston Land.

Lat. 66° to 69° N.

Long. 112° to 117° W.

I cannot dismiss this subject, however briefly introduced, without adverting to the advantage I have derived from the study of Sir John Richardson's admirable Essay on the Geographical Distribution of (American) plants in the country north of the 49th parallel of latitude in his "Arctic Searching Expedition" (ii. 264).

I. DR. LYALL'S Collection.

1. Thalictrum alpinum, *L.*
Hab. Disco.

2. Ranunculus nivalis, *L.*
Hab. Disco, Navy Board Inlet, Pond's Bay, Beechey Island, and Northumberland Sound.

3. Papaver nudicaule, *L.*
Hab. Wellington Channel, &c., abundant.

4. Arabis alpina, *L.*
Hab. Disco.

5. Draba alpina, *Wahl.*
—— *glacialis*, Adams.
—— *algida*, Adams.
Hab. Beechey Island and Wellington Channel.

6. Draba micropetala, *Hook.*
Hab. Wellington Channel.

7. Draba rupestris, *R. Br.*
Hab. Powell Creek and Beechey Island.

8. Cochlearia anglica, *DC.*
Hab. Pond's Bay, Beechey Island, and Wellington Channel.

9. Platypetalum purpurascens, *R. Br.*
Hab. Lancaster Sound.

10. Silene acaulis, *L.*
Hab. Disco.

11. Lychnis apetala, *L.*
Hab. Wellington Channel.

12. Larbræa uliginosa, *Hook.*
Hab. Disco.

13. Stellaria glauca, *L.*
Hab. Disco.

14. Stellaria longipes, *Goldie.*
Hab. Wellington Channel.

15. Arenaria rubra, *L.*
Hab. Disco.

16. Arenaria rubella, *Hook.*
Hab. Beechey Island.

17. Arenaria Rossii, *R. Br.*
Hab. Beechey Island and Northumberland Sound.

18. Honckeneya peploides, *Ehrh.*
Hab. Whale Fish Island.

19. Cerastium alpinum, *L.*
Hab. Whale Fish Island, Disco, and Wellington Channel.

20. Oxytropis campestris, *L.*
Hab. Pond's Bay.

21. Alchemilla vulgaris, *L.*
Hab. Disco.

22. Dryas integrifolia, *Vahl.*
Hab. Beechey Island, Northumberland Sound, and Powell Creek.

23. Dryas octopetala, *L.*
Hab. Wellington Channel.

24. Potentilla crocea, *Salisb.*
Hab. Disco.

25. Potentilla pulchella, *R. Br.*
Hab. Powell Creek, Beechey Island, and Northumberland Sound.

26. Potentilla nivea, *L.*
Hab. Disco.

27. Potentilla pulchella, *R. Br.* ?
Hab. Disco.

28. Epilobium latifolium, *L.*
Hab. Disco.

29. Saxifraga Hirculus, *L.*
Hab. Beechey Island, Wellington Channel, and Northumberland Sound.

30. Saxifraga flagellaris, *Willd.*
Hab. Beechey Island, Wellington Channel, and Northumberland Sound.

31. Saxifraga tricuspidata, *Retz.*
Hab. Pond's Bay and Disco.

32. Saxifraga nivalis, *L.*
Hab. Beechey Island and Wellington Channel.

33. Saxifraga cæspitosa, *L.*
Hab. Whale Fish Island, Powell Creek, Beechey Island, Wellington Channel, and Northumberland Sound.

34. Saxifraga hirta, *Haw.*
Hab. Disco.

35. Saxifraga cernua, *L.*
Hab. Beechey Island, Wellington Channel, and Northumberland Sound.

36. Saxifraga rivularis, *L.*
Hab. Disco.

Saxifraga rivularis, *var.* hyperborea.
Hab. Wellington Channel and Powell Creek.

37. Saxifraga Aizoon, *Jacq.*
Hab. Disco.

38. Saxifraga oppositifolia, *L.*
Hab. Abundant as far North as Northumberland Sound.

39. Chrysosplenium alternifolium, *L.*
Hab. Wellington Channel.

40. Angelica officinalis, *L.*
Hab. Disco.

41. Taraxacum dens-leonis, *Desf.*
Hab. Disco. Wild and introduced forms.

42. Gnaphalium sylvaticum, *L.*
Hab. Disco.

43. Gnaphalium supinum, *L.*
Hab. Disco.

44. Antennaria alpina, *Gærtn.*
Hab. Disco.

45. Erigeron uniflorum, *L.*
Hab. Disco.

46. Campanula linifolia, *A. DC.*
Hab. Disco.

47. Vaccinium uliginosum, *L.*
Hab. Disco and Pond's Bay.

48. Azalea procumbens, *L.*
Hab. Whale Fish Island.

49. Pyrola rotundifolia, *L.*
Hab. Disco and Whale Fish Island.

50. Cassiopea tetragona, *Don.*
Hab. Whale Fish Island, Navy Board Inlet, Pond's Bay, Beechey Island, and Northumberland Sound.

51. Ledum palustre, *L.*
Hab. Whale Fish Island.

52. Phyllodoce taxifolia, *Don.*
Hab. Disco.

53. Pedicularis hirsuta, *L.*
Hab. Disco, Pond's Bay, Beechey Island, and Wellington Channel.

54. Veronica alpina, *L.*
Hab. Disco.

55. Bartsia alpina, *L.*
Hab. Disco.

56. Empetrum nigrum, *L.*
Hab. Whale Fish Island and Disco.

57. Polygonum viviparum, *L.*
Hab. Disco, Powell Creek, Beechey Island, and Wellington Channel.

58. Oxyria reniformis, *L.*
Hab. Disco, Powell Creek, Beechey Island, and Northumberland Sound.

59. Betula nana, *L.*
Hab. Disco.

60. Salix arctica, *R. Br.*
Hab. Disco, Navy Board Inlet, Powell Creek, Beechey Island, and Wellington Channel.

61. Salix polaris, *Wahl.*
Hab. Powell Creek.

62. Peristylus albidus, *Lindl.*
Hab. Disco.

63. Platanthera hyperborea, *Lindl.*
Hab. Disco.

64. Juncus biglumis, *L.*
Hab. Powell Creek and Wellington Channel.

65. Luzula parviflora, *Desv.*
Hab. Disco.

66. Luzula spicata, *Desv.*
Hab. Wellington Channel?*

67. Luzula hyperborea, *R. Br.*
Hab. Disco, Powell Creek, Beechey Island, and Wellington Channel.

68. Luzula campestris, *Desv.*
Hab. Whale Fish Island.

69. Elymus arenarius, *L.*
Hab. Disco.

70. Festuca rubra, *L.*
Hab. Disco and Beechey Island.

71. Festuca brevifolia, *R. Br.*
Hab. Whale Fish Island, Beechey Island, and Wellington Channel.

72. Poa pratensis, *L.*
Hab. Disco.

73. Poa angustata, *R. Br.*
Hab. Powell Creek, Beechey Island, and Wellington Channel.

74. Poa cæsia, *Sm.*
Hab. Beechey Island.

Poa cæsia, *var.* **vivipara.**
Hab. Beechey Island.

75. Poa laxa, *Hænke.*
Hab. Lancaster Sound.

76. Glyceria arctica, *Hook.*
Hab. Wellington Channel.

77. Pleuropogon Sabinii, *R. Br.*
Hab. Powell Creek.

78. Phippsia algida, *R. Br.*
Hab. Cape York.

79. Dupontia Fischeri, *R. Br.*
Hab. Beechey Island.

80. Hierochloe alpina, *Rœm. & Sch.*
Hab. Beechey Island.

81. Colpodium latifolium, *R. Br.*
Hab. Wellington Channel.

82. Phleum alpinum, *L.*
Hab. Disco.

83. Alopecurus alpinus, *Sm.*
Hab. Cape York, Pond's Bay, Powell Creek, Beechey Island, and Wellington Channel.

84. Trisetum subspicatum, *Beauv.*
Hab. Disco.

85. Eriophorum capitatum, *Host.*
Hab. Whale Fish Island and Powell Creek.

86. Eriophorum polystachyum, *L.*
Hab. Disco, Powell Creek, and Wellington Channel.

87.† Carex festiva, *Dewey.*
Hab. Disco Island.

88. Carex hyperborea, *Drejer.*
Hab. Disco Island, Powell Creek, and Coast of Greenland.

89. Carex rariflora, *Smith.*
Hab. Whale Fish Island.

90. Equisetum arvense, *L.*
Hab. Whale Fish Island and Disco.

91. Equisetum variegatum, *L.*
Hab. Disco.

92. Polystichum Lonchitis, *Presl.*
Hab. Disco.

93. Cystopteris fragilis, *Bernh.*
Hab. Disco.

94. Lycopodium annotinum, *L.*
Hab. Disco.

95. Lycopodium Selago, *L.*
Hab. Whale Fish Island and Disco.

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* More probably from Disco.
† The Carices were named by Dr. Boott.

Musci.

(Determined by W. Mitten, Esq., A.L.S.)

1. Distichium capillaceum, *B. & S.*
Hab. Beechey Island, between Beechey Island and Northumberland Sound, and Navy Board Inlet.

2. Leptotrichum flexicaule, *Hmpe.*
Hab. Wellington Channel.

3. Dicranum elongatum, *Schleich.*
Hab. Pond's Bay.

4. Dicranum strumiferum, *Ehrh.*
Hab. Arctic Greenland: fertile.

5. Splachnum Wormskioldii, *Hsch.*
Hab. Cape York: fertile.

6. Conostomum boreale, *Sw.*
Hab. Powell Creek, Lancaster Sound.

7. Bartramia fontana, *Schw.*
Hab. Disco Island: fertile.

8. Bartramia ithyphylla, *Brid.*
Hab. Disco Island: fertile.

9. Pottia Heimii, *Fürnr.*
Hab. Beechey Island: fertile.

10. Desmatodon obliquus, *Bruch.*
Hab. Beechey Island: fertile.

11. Trichostomum rigidulum, *Sm.*
Hab. Beechey Island, Navy Board Inlet.

12. Tortula ruralis, *Hedw.*
Hab. Beechey Island, and between there and Northumberland Sound.

13. Tortula leucostoma, *R. Br.*
Hab. Beechey Island: fertile.

14. Encalypta rhabdocarpa, *Schw.*
Hab. Wellington Channel, Beechey Island: fertile.

15. Zygodon Lapponicus, *B. & S.*
Hab. Arctic Greenland: fertile.

16. Grimmia apocarpa, *Hedw.*
Hab. Arctic Greenland, Powell Creek, Lancaster Sound.

17. Racomitrium lanuginosum, *Brid.*
Hab. Whale Fish Island.

18. Mielichhoferia nitida, *Hsch.*
Var. gymnostoma; cætera ut in formâ γ. elongata.
Hab. Wellington Channel and Beechey Island: fertile.

19. Bryum nutans, *Schreb.*
Hab. Whale Fish Island, Cape York, Wellington Channel, Beechey Island, and Pond's Bay: fertile.

20. Bryum albicans, *Wahl.*
Hab. Disco Island.

21. Bryum crudum, *Schreb.*
Hab. Disco Island, Beechey Island.

22. Bryum cernuum, *B. & S.*
Hab. Whale Fish Island, Wellington Channel, Powell Creek, Lancaster Sound: fertile.

23. Bryum bimum, *Schreb.*
Hab. Beechey Island.

24. Bryum calophyllum, *R. Br.*
Hab. Beechey Island: fertile.

25. Bryum pallens, *Sw.*
Hab. Between Beechey Island and Northumberland Sound.

26. Bryum pseudo-triquetrum, *Hedw.*
Hab. Navy Board Inlet.

27. Bryum Ludwigii, *Spreng.*
Hab. Whale Fish Island.

28. Mnium affine, *Bland.*
Hab. Whale Fish Island, Beechey Island, Wellington Channel.

29. Mnium hymenophylloides, *Hüb.*
Hab. Navy Board Inlet.

30. Cinclidium stygium, *Sw.*
Hab. Wellington Channel.

31. Aulacomnion palustre, *Schw.*
Hab. Whale Fish Island.

32. Aulacomnion turgidum, *Schw.*
Hab. Whale Fish Island, Powell Creek, between Beechey Island and Northumberland Sound.

33. Timmia Megapolitana, *Hedw.*
Hab. Wellington Channel.

34. Timmia austriaca, *Hedw.*
Hab. Between Beechey Island and Northumberland Sound.

35. Polytrichum juniperinum, *Hedw.*
Hab. Cape York, Whale Fish Island.

36. Polytrichum formosum, *Hedw.*
Hab. Disco Island.

37. Hypnum julaceum, *Vill.*
Hab. Wellington Channel, Pond's Bay, Navy Board Inlet.

38. Hypnum chryseum, *Schw.*
Hab. Wellington Channel, Beechey Island, Pond's Bay.

39. Hypnum pulchellum, *Dicks.*
Hab. Between Beechey Island and Northumberland Sound.

40. Hypnum splendens, *Hedw.*
Hab. Disco Island.

41. Hypnum rutabulum, *L.*
Hab. Disco Island.

42. Hypnum salebrosum, *Hoffm.*
Hab. Beechey Island, Navy Board Inlet.

43. Hypnum cirrhosum, *Schw.*
Hab. Beechey Island.

44. Hypnum Sprucei, *Bruch.*
Hab. Navy Board Inlet.

45. Hypnum filicinum, *L.*
Hab. Beechey Island.

46. Hypnum stellatum, *Schreb.*
Hab. Wellington Channel, Pond's Bay.

Hypnum stellatum, *var.* foliis basi profundè excavatis.
Hab. Navy Board Inlet.
Differing in appearance from usual states of the species, but, so far as yet observed, without tangible specific character.

47. Hypnum uncinatum, *Hedw.*
Hab. Wellington Channel, Disco Island, Beechey Island, Navy Board Inlet, Arctic Greenland.

48. Hypnum cordifolium, *Hedw.*
Hab. Whale Fish Island.

Hepaticæ.

(Determined by W. MITTEN, Esq., A.L.S.)

1. Jungermannia concinnata, *Lightf.*
Hab. Whale Fish Island.

2. Jungermannia barbata, *Schreb.*
Hab. Disco Island, Pond's Bay.

3. Jungermannia trichophylla, *L.*
Hab. Pond's Bay, Navy Board Inlet.

4. Plagiochila asplenioides, *M. & N.*
Hab. Pond's Bay.

5. Ptilidium ciliare, *Nees ab E.*
Hab. Whale Fish Island. Between Beechey Island and Northumberland Sound.

6. Frullania Tamarisci, *Nees ab E.*
Hab. Navy Board Inlet.

7. Sarcomitrium pingue, (*L.*) *Mitten.*
Hab. Beechey Island.

8. Marchantia polymorpha, *L.*
Hab. Whale Fish Island, Disco Island.

9. Preissia commutata, *Nees ab E.*
Hab. Wellington Channel.

II. DR. ANDERSON'S and HERR MIERTSCHING'S Collections.

1. Anemone Richardsoni, *Hook.*
Hab. Minto Inlet.

2. Ranunculus nivalis, *L.*
Hab. Banks' Land.

3. Ranunculus affinis, *R.Br.*
Hab. Bay of Mercy, Minto Inlet, and Cambridge Gulf.

4. Caltha arctica, *L.*
Hab. Cambridge Gulf and Minto Inlet.

5. Papaver nudicaule, *L.*
Hab. Banks' Land, &c., abundant.

6. Cardamine digitata, *Richards.*
Hab. Banks' Land.

7. Hesperis Hookeri, *Led.*
Hab. Minto Inlet.

8. Parrya arctica, *R.Br.*
Hab. Cambridge Gulf and Minto Inlet.

9. Vesicaria arctica, *Richards.*
Hab. Minto Inlet.

10. Draba alpina, *Wahl.* (*D. glacialis*, Adams, and *algida*, Adams.)
Hab. Banks' Land, &c.

11. Draba hirta, *L.*
Hab. Banks' Land, Albert Sound, Minto Inlet, and Cambridge Gulf.

12. Draba incana, *L.*
Hab. Banks' Land.

13. Draba rupestris, *R.Br.*
Hab. Bay of Mercy, Banks' Land.

14. Cochlearia anglica, *DC.*
Hab. Banks' Land, &c.

15. Platypetalum purpurascens, *R.Br.*
Hab. Minto Inlet.

16. Eutrema Edwardsii, *R.Br.*
Hab. Minto Inlet and Cambridge Gulf.

17. Silene acaulis, *L.*
Hab. Banks' Land and P. Albert's Sound.

18. Lychnis apetala, *L.*
Hab. Baring Land, Cambridge Bay, and Minto Inlet.

19. Stellaria longipes, *Goldie.*
Hab. Banks' Land, &c.

20. Honckeneya peploides, *Ehrh.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.

21. Cerastium alpinum, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.

22. Linum perenne, *L.*
Hab. Minto Inlet.

23. Lupinus perennis, *L.*
Hab. Banks' Land.

24. Hedysarum M'Kenzii, *Richards.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.

25. Hedysarum boreale, *Richards.*
Hab. Minto Inlet.

26. Phaca astragalina, *DC.*
Hab. Minto Inlet and Cambridge Gulf.

27. Phaca aboriginorum, *Richards.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.

28. Oxytropis campestris, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.

29. Oxytropis Uralensis, *var.* arctica.
Hab. Banks' Land, Cambridge Gulf, and Minto Inlet.

30. Oxytropis nigrescens, *Fisch.*
Hab. Minto Inlet and Cambridge Gulf.

31. Dryas integrifolia, *Vahl.*
Hab. Banks' Land.

32. Potentilla nivea, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Gulf.

33. Potentilla nana, *Lehm.*
Hab. Banks' Land.

34. Epilobium latifolium, *L.*
Hab. Minto Inlet and Cambridge Gulf.

35. Epilobium alpinum, *L.*
Hab. Minto Inlet.

36. Hippuris vulgaris, *L.*
Hab. Cambridge Bay.

37. Saxifraga Hirculus, *L.*
Hab. Minto Inlet and Cambridge Bay.

38. Saxifraga aizoides, *L.*
Hab. Minto Inlet.

39. Saxifraga flagellaris, *Willd.*
Hab. Banks' Land.

40. Saxifraga tricuspidata, *Retz.*
Hab. Banks' Land and Minto Inlet.

41. **Saxifraga** hieraciifolia, *Kit.*
Hab. Cambridge Bay.

42. Saxifraga nivalis, *L.*
Hab. Banks' Land and Cambridge Gulf.

43. Saxifraga cæspitosa, *L.*
Hab. Banks' Land.

44. Saxifraga cernua, *L.*
Hab. Banks' Land, Minto Inlet, Cambridge Gulf, Point Drew, and Point Pitt.

45. Saxifraga oppositifolia, *L.*
Hab. Abundant throughout Banks' Land, &c.

46. Chrysosplenium alternifolium, *L.*
Hab. Cambridge Gulf.

47. Taraxacum dens-leonis, *Desf.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.

48. Senecio frigidus, *Less.*
Hab. Banks' Land, Minto Inlet, and Point Bathurst.

49. Senecio palustris, *var.* congestus.
Hab. Banks' Land, Cambridge Gulf, and Minto Inlet.

50. Senecio aureus, *L.*?
Hab. Point Drew, Jones' Island, and Cape Bathurst.

51. Arnica angustifolia, *Vahl.*
Hab. Banks' Land and Minto Inlet.

52. Artemisia vulgaris, *L.*, *var.* Tilesii.
Hab. Point Drew and Cape Bathurst.

53. Artemisia borealis, *Pall.*
Hab. Minto Inlet.

54. Leucanthemum integrifolium, *DC.*
Hab. Minto Inlet and Cambridge Gulf.

55. Leucanthemum arcticum, *DC.*
Hab. Point Maitland.

56. Erigeron ——?
Hab. Banks' Land.

57. Erigeron uniflorum, *L.*
Hab. Banks' Land and Minto Inlet.

58. Nardosmia corymbosa, *Hook.*
Hab. Banks' Land, Point Drew, and Minto Inlet.

59. Campanula linifolia, *A.DC.*
Hab. Minto Inlet.

60. Vaccinium uliginosum, *L.*
Hab. Minto Inlet.

61. Cassiopea tetragona, *Don.*
Hab. Banks' Land and Minto Inlet.

62. Arbutus alpina, *L.*
Hab. Banks' Land, Minto Inlet, Point Drew, Cape Bathurst, and Jones' Island.

63. Polemonium cæruleum, *L.*, *var.* β.
Hab. Banks' Land.

64. Primula Hornemanniana, *Lehm.*
Hab. Banks' Land.

65. Androsace septentrionalis, *L.*
Hab. Minto Inlet and Cambridge Bay.

66. Androsace Chamæjasme, *Wulf.*
Hab. Banks' Land, Cape Bathurst, &c.

67. Phlox Richardsonii, *Hook.*
Hab. Banks' Land.

68. Castilleja pallida, *Spr.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.

69. Pedicularis capitata, *Adams.*
Hab. Minto Inlet and Cambridge Bay.

70. Pedicularis Sudetica, *Willd.*
Hab. Minto Inlet, Cambridge Bay, Points Drew, Pitt, Armstrong and Maitland.

71. Pedicularis hirsuta, *L.*
Hab. Banks' Land, Minto Inlet, and Cambridge Bay.

72. Armeria arctica, *Wallr.*
Hab. Minto Inlet and Cambridge Bay.

73. Polygonum viviparum, *L.*
Hab. Banks' Land, Cambridge Gulf, and Minto Inlet.

74. Oxyria reniformis, *Hook.*
Hab. Banks' Land, &c.

75. Salix myrsinites, *L.*
Hab. Prince Albert's Sound.

76. Salix Richardsonii, *Hook.*
Hab. Minto Inlet.

77. Salix myrtilloides, *L.*
Hab. Banks' Land.

78. Salix desertorum ?, *Richards.*
Hab. Minto Inlet.

79. Salix speciosa, *Hook.*
Hab. Banks' Land.

80. Salix polaris, *Wahl.*
Hab. Cape Bathurst.

81. Salix reticulata, *L.*
Hab. Cambridge Bay and Minto Inlet.

82. Triticum repens, *L.*, *var.* purpureum.
Hab. Banks' Land, Points Warren and Pitt.

83. Elymus arenarius, *L.*
Hab. Banks' Land, Minto Inlet, and Point Warren.

84. Festuca brevifolia, *R.Br.*
Hab. Banks' Land, Point Drew, Cape Bathurst, and Jones' Island.

85. Poa laxa, *Hænke.*
Hab. Point Drew.

86. Catabrosa aquatica, *Beauv.* ?
Hab. Banks' Land.

87. Glyceria arctica, *Hook.*
Hab. Minto Inlet.

88. Deschampsia cæspitosa, *Beauv.*
Hab. Minto Inlet.

89. Dupontia Fischeri, *R.Br.*
Hab. Points Maitland and Warren.

90. Hierochloe pauciflora, *R.Br.*
Hab. Minto Inlet.

91. Calamagrostis stricta, *Beauv.*
Hab. Point Maitland.

92. Calamagrostis purpurascens, *R. Br.*
Hab. Minto Inlet.

93. Colpodium latifolium, *R.Br.*
Hab. Minto Inlet.

94. Alopecurus alpinus, *Sm.*
Hab. Banks' Land, Cambridge Bay, and Minto Inlet.

95. Eriophorum capitatum, *Host.*
Hab. Banks' Land, Minto Inlet, Point Drew, and Cambridge Bay.

96. Eriophorum vaginatum, *L.*
Hab. Minto Inlet.

97. Eriophorum polystachyum, *L.*
Hab. Banks' Land, Prince Albert's Sound, and Minto Inlet.

98. Carex * scirpoidea, *Mich.*
Hab. Minto Inlet.

99. Carex incurva, *Lightf.*
Hab. Minto Inlet.

100. Carex rigida, *Good.*
Hab. Banks' Land.

101. Carex stans, *Drejer.*
Hab. Minto Inlet.

102. Carex compacta, *R.Br.*
Hab. Minto Inlet.

103. Carex vaginata, *Tausch.*
Hab. Minto Inlet.

104. Carex fuliginosa, *Sternb. & Hoppe.*
Hab. Minto Inlet and Cambridge Bay.

105. Carex ustulata, *Wahl.*
Hab. Cambridge Bay.

106. Elyna spicata, *Schrad.*
Hab. Minto Inlet.

107. Equisetum arvense, *L.*
Hab. Banks' Land and Minto Inlet.

108. Cystopteris fragilis, *Bernh.*
Hab. Minto Inlet.

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* I owe the names of the Carices to the kindness of Dr. Boott.

III. MR. RAE'S Collections.

1. Anemone Richardsonii, *Hook.*
2. Anemone parviflora, *Mich.*
3. Ranunculus Purshii β, *Rich.*
4. Ranunculus hyperboreus, *Rottb.*
5. Caltha arctica, *L.*
6. Draba incana, *L.*
7. Erysimum cheiranthoides, *L.*
8. Oxytropis deflexa, *Dec.*
9. Oxytropis campestris, *Dec.*
10. Oxytropis Uralensis, *DC.*
11. Oxytropis nigrescens, *Fisch.*
12. Phaca astragalina, *DC.*
13. Phaca aboriginorum, *Richards.*
14. Lupinus perennis, *L.*
15. Hedysarum M'Kenzii, *Richards.*
16. Hedysarum boreale, *Nutt.*
17. Sieversia Rossii, *R.Br.*
18. Dryas integrifolia, *Vahl.*
19. Dryas octopetala, *L.*
20. Potentilla biflora, *Willd.*
21. Potentilla fruticosa, *L.*
22. Epilobium latifolium, *L.*
23. Saxifraga Hirculus, *L.*
24. Saxifraga tricuspidata, *Roth.*
25. Saxifraga nivalis, *L.*
26. Saxifraga cæspitosa, *L.*
27. Saxifraga cernua, *L.*
28. Saxifraga rivularis, *L.*
29. Saxifraga oppositifolia, *L.*
30. Taraxacum dens-leonis, *Desf.*
31. Senecio palustris, *var.* congestus, *DC.*
32. Arnica angustifolia, *Vahl.*
33. Antennaria alpina, *Gærtn.*
34. Pyrethrum inodorum, *var.* pumilum, *Smith.*
35. Leucanthemum integrifolium, *DC.*
36. Achillea Millefolium, *L.*
37. Erigeron compositum, *Pursh.*
38. Erigeron uniflorum, *L.*
39. Aster pygmæus, *Torr. & Gray.*
40. Campanula linifolia, *Lam.*
41. Gentiana propinqua, *Richards.*
42. Vaccinium uliginosum, *L.*
43. Cassiopea tetragona, *G.Don.*
44. Ledum palustre, *L.*
45. Rhododendron lapponicum, *Wahl.*
46. Arbutus alpina, *L.*
47. Primula Hornemanniana, *Lehm.*
48. Androsace septentrionalis, *L.*
49. Androsace Chamæjasme, *Wulf.*
50. Phlox Richardsonii, *Hook.*
51. Castilleja pallida, *Spr.*
52. Pedicularis capitata, *Adams.*
53. Pedicularis Sudetica, *Willd.*
54. Pedicularis hirsuta, *L.*
55. Pinguicula vulgaris, *L.*
56. Mertensia maritima, *Roth.*
57. Plantago lanceolata, *L.*
58. Empetrum nigrum, *L.*
59. Armeria arctica, *Wallr.*
60. Polygonum viviparum, *L.*
61. Oxyria reniformis, *Hook.*
62. Salix glauca, *L.*
63. Salix Richardsonii, *Hook.*
64. Salix arctica, *Pall.*
65. Salix reticulata, *L.*
66. Triticum repens, *L.*, *var.* purpureum.
67. Festuca brevifolia, *R.Br.*
68. Poa cæsia, *Smith?*
69. Poa laxa, *Hænke.*
70. Dupontia Fischeri, *R.Br.*
71. Hierochloe alpina, *R. & S.*
72. Calamagrostis Canadensis, *Beauv.*
73. Colpodium latifolium, *R.Br.*
74. Alopecurus alpinus, *Sm.*
75. Trisetum subspicatum, *Beauv.*
76. Eriophorum capitatum, *Host.*
77. Eriophorum polystachyum, *L.*
78. Carex * stans, *Drejer.*
79. Lycopodium Selago, *L.*

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* Named by Dr. Boott.

On the Botany of Raoul Island, one of the Kermadec group in the South Pacific Ocean. By J. D. HOOKER, Esq., M.D. F.R.S., F.L.S. &c.

[Read April 1st, 1856.]

THE materials from which the following sketch is drawn up consist of a small collection of plants made upon Raoul Island, by Mr. M'Gillivray, late Naturalist to H.M.S. *Herald*, under the command of Captain Denham, R.N., who forwarded the collection in question to Sir W. Hooker; and whose zealous exertions in furthering the scientific objects of the expedition under his command demand the grateful acknowledgement of all classes of naturalists.

Very little being known of the Kermadec group, I applied to Captain Washington, R.N., the present able and assiduous Hydrographer to the Admiralty, who promptly forwarded me the following information.

The name of Kermadec Islands was first given, in the chart accompanying Admiral Rossel's account of D'Entrecasteaux's voyage in search of La Peyrouse, to a group situated about 450 miles N.E. of New Zealand, between that group and the Fijis. They consist of four principal islands, Macauley and Curtis Islands, discovered before D'Entrecasteaux's visit, by Lieutenant Watts in the *Penrhyn* in 1788, and Raoul and Esperance Islands, by D'Entrecasteaux on March 15th, 1793.

Raoul, or Sunday Island, is described both by D'Entrecasteaux (vol. i. 295) and D'Urville (Voy. de l'Astrolabe, iii. 7) as triangular, and not more than four leagues in circumference, forming a high, rugged, steep mountain covered with wood. Commodore Wilkes, who afterwards visited it, adds that it appears to be volcanic, and that its rocks rise like basaltic columns.

Captain Denham in H.M.S. *Herald* finished the survey of this island on July 24th, 1854, and reports that "it is in lat. 29° 15' 30" S., long. 177° 54' 52" W., and that its maximum altitude is 1627 feet." Its only inhabitants consist of a family from New York, to whose humane disposition he is indebted, under the trying circumstances of having to inter his son close to their settlement. Poultry, vegetables and water can be procured there during the summer.

Some further information regarding Raoul Island is given by Mr. Milne (Botanical Collector to the Expedition) in Hooker's 'Journal of Botany' (vii. 151), where the luxuriance of the Cryptogamic vegetation is particularly alluded to, and the presence of a Palm and some *Orchideæ*, of which, however, no specimens have hitherto been transmitted.

Macauley and Curtis Islands are very much smaller, and L'Esperance is a mere rock.

The most interesting circumstance connected with the vegetation of Raoul Island is the identity of most of the flowering plants, and all but one of the ferns, that have been collected upon it, with those of New Zealand. The great extent of intervening ocean (450 miles), and the small size of the islands, would appear to render it extremely difficult to account for this similarity of vegetation by transport; added to which, the prevailing winds blow from the north-west, and the oceanic currents set in the same direction.

It is also worthy of remark, that of the nine species that are not natives of New Zealand, four are new, and three of these are nearly allied to New Zealand plants; whilst of those five that are not new, three are widely diffused throughout the tropical and subtropical Pacific islands, and would appear not to be capable of enduring the cold of New Zealand; these are the *Metrosideros polymorpha*, *Piper latifolium*, and *Omalanthus nutans*.

The absence of any Ferns (with a single exception) but such as are natives of New Zealand, is, however, a far more striking fact, both because the list is a large one for so small an island (twenty-two species), and because, if their presence is to be accounted for wholly by trans-oceanic transport of these species, the question at once occurs, why has there been no addition of some of the many Fiji or New Caledonian Island ferns, that are common tropical Pacific species, the Fiji Islands being only 700 miles north of the Kermadecs, and New Caledonia 750. The only fern which is not a native of New Zealand, is the Norfolk Island *Asplenium difforme*.

Still more remarkable is the total absence in the collection of any of the plants peculiar to Norfolk Island, for Raoul Island is in the same latitude as Norfolk Island, is exactly the same distance from New Zealand, and the winds and currents set from Norfolk to Raoul Island: in short, though the northern extreme of New Zealand, Norfolk Island and Raoul Island form an equilateral triangle, with the exception of *Asplenium difforme*, there is not a single fern of Norfolk Island found in Raoul Island that is not also found in New Zealand; whilst of the twenty flowering plants of Raoul Island, no less than six are absolutely peculiar to New Zealand and Raoul Island, and with the exception of the tropical, widely diffused Pacific species, there are no phænogamic plants or ferns confined to Norfolk Island and Raoul Island. It is further remarkable that of the Raoul Island ferns, *Cyathea medullaris* and *Pteris falcata* have not been found in Norfolk Island.

There is no doubt that a complete flora of Raoul Island would modify these results; but there can also be no doubt that it would confirm these indications of its affinities being most strong with that of New Zealand, and feeble to a very unaccountable degree with the floras of those other groups with which it might be expected to possess a very strong relationship.

Of the twenty flowering plants, three are noticed by the collector as being possibly introduced by man, viz. *Sicyos angulatus*, *Gnaphalium luteo-album*, and *Oplismenus æmulus*, all of which were found to affect cultivated ground. These are, however, so widely distributed in the South Pacific Islands, New Zealand, and Australia, that it is quite as probable as not that they are truly wild in the Kermadec group, and only grow in more abundance upon prepared soil. All have, however, appendages that would favour their transport, as the glochidiate setæ of the fruit of the *Sicyos*, the awn of the glume of *Oplismenus*, and the pappus of *Gnaphalium*.

With regard to the remaining seventeen flowering plants, I recognize special adaptations for transport in the following two only:—*Bidens leucantha**, in the barbed setæ of the fruit, and *Lagenophora petiolata*, in the viscid fruit. Of the rest none seem in any way adapted for transport, unless the minute and numerous seeds of the *Lobelia*, *Acianthus*, and *Metrosideros* be so regarded.

DICOTYLEDONES.

1. Coriaria ruscifolia, *L.*
2. Metrosideros polymorpha, *Gaud.*
3. Sicyos angulatus, *L.*
4. Coprosma petiolata, *n. sp.*
5. Coprosma acutifolia, *n. sp.*
6. Panax arboreum, *Forst.*
7. Lagenophora petiolata, *H. f.*
8. Bidens leucantha, *Willd.*
9. Gnaphalium luteo-album, *L.*
10. Scævola gracilis, *n. sp.*
11. Lobelia anceps, *Thunb.*
12. Veronica parviflora, *Vahl.*
13. Myoporum lætum, *Forst.*
14. Omalanthus nutans, *Guill.*
15. Piper latifolium, *Forst.*
16. Peperomia Urvilleana, *A. Rich.*
17. Ascarina lanceolata, *n. sp.*

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* This, though not included in the New Zealand flora, has been latterly introduced into the neighbourhood of Auckland, &c.

MONOCOTYLEDONES.

18. Acianthus Sinclairii, *H. f.*
19. Isolepis nodosa, *R. Br.*
20. Oplismenus æmulus, *R. Br.*

FILICES & LYCOPODIACEÆ.

21. Cyathea medullaris, *Sw.*
22. Hymenophyllum demissum, *Sw.*
23. Adiantum hispidulum, *Sw.*
24. Pteris falcata, *R. Br.*
25. Pteris aquilina, *L.*, *var.* esculenta.
26. Pteris comans, *Forst.*
27. Pteris tremula, *R. Br.*
28. Lomaria procera, *Spr.*
29. Lomaria lanceolata, *Spr.*
30. Doodia caudata, *R. Br.*
31. Asplenium flaccidum, *Forst.*
32. Asplenium difforme, *R. Br.*
33. Asplenium polyodon, *Forst.*
34. Asplenium obtusatum, *Forst.*
35. Asplenium lucidum, *Forst.*
36. Nephrodium decompositum, *R. Br.*
37. Polystichum aristatum, *Presl.*
38. Hypolepis tenuifolia, *Bernh.*
39. Phymatodes Billardieri, *Presl.*
40. Niphobolus rupestris, *Spr.*
41. Psilotum triquetrum, *Sw.*
42. Lycopodium Billardieri, *Spring.*

Descriptions of the New Species.

COPROSMA PETIOLATA, *H. fil.*; ramis cylindricis cortice pallido, ramulis petiolisque puberulis, foliis gracilè petiolatis elliptico-oblongis obovatisve obtusis subcoriaceis, stipulis transversè elongatis abruptè longè acuminatis, costis puberulis, floribus capitatis, pedunculis infra v. supra medium bracteolatis, fl. ♂ subsessilibus congestis, calyce brevissimo, corollâ latè campanulatâ profundè 4-fidâ, fl. ♀ 3–5 sessilibus, calycis limbo truncato, corollâ brevi cylindricâ breviter 4-fidâ, stylis crassis erectis.

C. Bauerianæ Ins. Norfolciæ et Nov. Zelandiæ similis, sed folia gracilius petiolata minus carnosa, et marginibus non aut vix recurvis.—Arbor parva, cortice lævi pallido. Folia 1–2 unc. longa, petiolo costâ venisque subtùs puberulis. Pedunculi puberuli, stricti v. curvi, petiolis æquilongi v. iis longiores, interdùm bifoliati. Flores ♂ plurimi, basi involucello brevi suffulti, ¼ unc. longi, alabastra subglobosa. Antheræ breviter oblongæ. Fl. ♀ pauciores, involucello longiore diphyllo suffulti.

COPROSMA ACUTIFOLIA, *H. fil.*; arborescens, ramis cortice lævi pallido tectis, foliis petiolatis membranaceis ovatis elliptico-ovatis ovato-lanceolatisve acuminatis, fl. ♂ ad apices pedunculorum solitariis binis ternisve subsessilibus; pedunculis simplicibus v. dichotomis, calyce minimo 4-lobo, corollâ infundibuliformi ad medium 4-fidâ, staminibus longè exsertis.

C. lucidæ, Forst., affinis, differt præcipuè foliis membrananceis.—Arbor parva, ramosa, cortice lævi pallido, ramulis gracilibus ultimis cylindricis. Folia 2⅓–2½ unc. longa, in petiolum ⅓ unc. longam angustata, penninervia, et reticulatim venosa. Pedunculi petiolis æquilongi v. iis longiores, dum divisi ad axillas stipulis connatis membranaceis instructi. Flores brevissimè pedicellati ⅓ unc. longi, ♂ tantum visi.

SCÆVOLA GRACILIS, *H. fil.*; procumbens, ramis herbaceis foliisque utrinque pubescenti-pilosis axillis villosis, foliis lanceolatis cuneato-lanceolatisve acutis irregulariter serrato-dentatis in petiolum elongatum angustatis, floribus in ramulis brevissimis axillaribus subsessilibus, foliis 4 lineari-lanceolatis floribus æquilongis bracteatis, calycis tubo brevi basi bracteolato, limbi lobis 5 inæqualibus, 3 subulatis, 2 intermediis brevibus, corollæ lobis angustis.

Calycis villosi tubus basi multibracteatus, sericeus, ¼ unc. longus, lobis valdè inæqualibus, 3 subulatis tubo corollæ ¼ brevioribus, 2 intermediis brevibus obtusis lobulatis. Corollæ flavidæ tubus lentè curvus, laciniæ tubo longiores, lineares, ligulatæ, acuminato-uncinatæ, supernè pauló dilatatæ, marginibus membranaceis undulatis, tubo intùs villoso supernè pilis capitatis opacis et secus basin limbi instructo. Stamina subæqualia, tubo corollæ breviora; filamenta filiformia, glaberrima; antheris linearibus muticis. Stylus pilosus. Stigma hemisphæricum, marginibus cupulæ ciliatis.

ASIMINA LANCEOLATA, *H. fil.*; arbuscula, foliis coriaceis petiolatis lanceolatis acuminatis grossè serratis subtùs glaucis, paniculis folio brevioribus.

A. lucidæ, H. fil., Novæ-Zelandiæ affinis, sed foliis lanceolatis longioribus et angustioribus, serraturis grossioribus apicibus curvis acutis. Folia 2–3 unc. longa, acuminata, basi in petiolum sensim angustata. Flores subimbricati.

Note on *Obolaria virginica*, L. By ASA GRAY, M.D., F.M.L.S. &c.—Extracted from a Letter to George Bentham, Esq., F.L.S. &c.

[Read April 15th, 1856.]

SEVERAL years ago, in a memoir* in which *Obolaria virginica* is figured and described, I endeavoured to show that this genus should be referred to the order *Gentianeæ*, *notwithstanding* a peculiarity in its placentation. I wish now to say, that it should be referred there *on account* of its placentation. Had I properly noted at the time what Grisebach states (in his *Gen. et Sp. Gentianearum*), respecting the ovules sometimes occupying several series somewhat remote from the sutures, or had I been led to inspect the ovary of almost any of our common Gentians, the case would have been clear at once. It is only recently that my former pupil, Mr. Henry J. Clark, has called my attention to the fact, hitherto unknown, I believe, that the ovules in most of our Gentians of the United States occupy the whole, or nearly the whole parietes of the ovary; sometimes in nearly definite rows, as in *G. quinqueflora*, but more commonly indefinitely crowded over every part except the very sutures, as in *G. Andrewsii*, *G. crinita*, &c. Examining some other genera, we found this to occur also in *Bartonia*, Muhl. (*Centaurella*, Michx.); equally so in both species, *B. tenella* and *B. verna*. In the former species, in which, as in *Obolaria*, four re-entering angles render the cell cruciform, the resemblance to *Obolaria* is striking and complete, as you will see from the enclosed sketch of a transverse section of the ovary of *B. tenella*. The only anomaly of *Obolaria* as a true *Gentianea* which remains, is the imbricative (instead of convolutive) æstivation of its corolla;—of which no parallel instance is known, so far as I am aware. It may however be expected to occur; for useful and reliable as the æstivation of the corolla often is, as an ordinal mark, it is seldom altogether constant.

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* Chloris Bor. Amer. in Mem. Amer. Acad. 1846.

I think I once mentioned to you an exception of this sort, or rather a variation, which occurs in a family in the arrangement of which you have employed æstivation of the corolla to great advantage, viz. the *Scrophulariaceæ*, in characterizing the *suborders* (as I would suggest they ought not to be called) *Antirrhinideæ* and *Rhinanthideæ*. The same accurate observer, Mr. Clark, long ago showed me that this character occasionally failed in *Mimulus*, especially in *M. ringens* and *M. moschatus*, which almost as frequently present the æstivation of the *Rhinanthideæ* (*i. e.* have some part of the lower lip exterior) as that of the *Antirrhinideæ*, to which the genus belongs. Last summer I noticed a second exception of the kind in a *Pentstemon* (*P. heterandrum*, Torr. & Gray, in Beckwith's Report of a Pacific Railroad Survey), which besides the anomaly of having the fifth stamen sometimes antheriferous and sometimes sterile, had also, in about half of the flowers examined, the lateral lobes of the corolla external in the bud, and covering the two posterior lobes as well as the anterior one.

On the Action of Sea-water on the Germination of Seeds. By CHARLES DARWIN, Esq., Vice-Pres. R.S., F.L.S. &c.

[Read May 6th, 1856.]

DURING the spring of last year it occurred to me that it would be worth while, in relation to the distribution of plants, to test how long seeds could endure immersion in sea-water, and yet retain their vitality. As far as I knew, this had not been tried by botanists, who would have been far more capable of doing it efficiently than myself; and I now find that M. Alph. DeCandolle, in his admirable work, "Géographie Botanique," regrets that such experiments have not been tried; I think, that had he known even the few facts here to be recorded, some of his opinions on the means of distribution of particular families would have been slightly modified. The Rev. M. J. Berkeley has likewise tested fifty-three different kinds of seeds, and has published a report in the "Gardener's Chronicle*," to which periodical I have also sent two brief notices on the same subject†. I intend here to give, with Mr. Berkeley's kind permission, an account of our joint experiments. I may premise, that not knowing, at first, whether the seeds would endure even a week's immersion, I selected a few by simple chance, taking, however, the seeds of different families; subsequently I have been aided by suggestions from Dr. Hooker.

I must briefly describe how my experiments were tried: the seeds were placed in small bottles, each holding two or three ounces of salt water, carefully made according to Schweitzer's analysis: as both *algæ* and marine animals have, as is well known, long survived in water thus made, there can be no doubt that the experiment was thus fairly tried. Mr. Berkeley sent his seeds to Ramsgate, tied up in little bags and placed in the sea-water, daily renewed; and they were thus immersed for three weeks, and when partially dried, but still damp, were sent off, but by accident were not unpacked for four days subsequently, so that their total immersion "was equivalent to one of more than a month." Some of my bottles were put out of doors in the shade, and were exposed to an average weekly temperature of from 35° to 57°; the other bottles were kept in my cellar, and were exposed to much less variation of temperature, viz. to a daily mean average of from 46° to 56°. Further, to test the effect of temperature, I immersed eighteen different sorts of seeds in salt water, in a tank, which, from containing much snow, was for six weeks at the temperature of 32°, slowly rising for the next six weeks to 44°; but the seeds thus tested did not seem to withstand the injurious effect of the salt water better than those exposed to a higher but variable temperature. I may remark, that amongst the eighteen kinds of seeds immersed in the cold salt water, there were seeds of a somewhat tender constitution, as capsicum and vegetable marrow, but the exposure to the cold in no degree injured their germination. In the case of some of the seeds which I first tried, and which were put out of doors, I did not change the salt water for fifty-six days, and it became putrid and smelt offensively to a quite surprising degree, especially the water with the cabbage, radish, cress and onion seed, which also gave out strongly the odour of each kind; so that I thought the putridity would infallibly have been communicated to the seeds; but judging from the seeds of some of the same plants (but not actually from the same lot of seed) placed in salt water often renewed, and likewise kept in the cellar under a less variable temperature, neither the putridity of the water nor the changing temperature had any marked effect on their vitality. Cress seed (*Lepidium sativum*) and that of *Phalaris Canariensis*, after twenty-two days' immersion, were thoroughly dried for a week and then planted; they germinated pretty well, but the seeds themselves of this particular lot were not very good. At first I tried the seeds after each successive week's immersion, and they germinated at the same period as did seeds of the same kind which had not been salted; celery and rhubarb seed, however, were somewhat accelerated in their germination. Some kinds of seeds, as of *Trifolium incarnatum*, *Sinapis nigra*, peas, kidney and common beans, swelled much in the salt water, and they generally were killed by a short immersion; but the swollen seeds of *Lupinus polyphyllus* germinated better than those which did not swell. I was surprised to observe that most of the seeds of *Convolvulus tricolor* germinated after seven days under the salt water and lived for some time in it; as did likewise the fresh seed of *Tussilago farfara* after 9 days; after 25 days I took out some of the young plants of the *Tussilago* and planted them, and one of them grew: some of the seeds of the garden orache (*Atriplex*) also germinated under water after 56 days' immersion, but I failed in raising the seedlings; the other seeds of the same lot of the orache germinated excellently after 100 days' immersion.

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* Sept. 1st, 1855.

† May 26th and Nov. 24th, 1855.

The total number of seeds tried by Mr. Berkeley and myself amount only to 87, for unfortunately we happened to select some of the same kinds; in one respect, however, this has been fortunate, for we have thus tested each other's results, and they accord perfectly as far as they go; the seed of the tomato, however, germinated better after a month's immersion with Mr. Berkeley than after only 22 days with me; but my seed appeared to be old. And this leads me to remark, that I suspect that fresh seed withstands the salt water better than old, but yet good seed; this was the case with *Trifolium incarnatum*, *Phlox Drummondii*, and I believe with *Sinapis nigra*. Of the genus *Godetia*, Mr. Berkeley found one species was killed by, and another survived, a month's immersion: but a far more curious case is presented by the varieties of the cabbage; for I found that good seed of the "Mammoth white broccoli" germinated after 11 days' immersion, but was killed by 22 days; seed of the "early cauliflower" survived 22 days, but was killed by 36 days; "Cattell's cabbage" germinated excellently after 36 days, but was killed by 50 days; and lastly, fresh seed of the wild cabbage from Tenby germinated excellently after 50 days, very well after 110 days, and two seeds out of some hundreds germinated after 133 days' immersion.

Of the 87 kinds of seeds tried, 23 or more than one quarter did not endure 28 days' immersion: capsicum has endured the trial best, for 30 out of 56 seeds germinated well after 137 days' immersion: of celery seed after the same period of 137 days, only 6 out of several hundreds germinated. The worst germinators have been dwarf kidney beans and *Hibiscus manihot*, both killed by 11 days' immersion; common peas were killed by 14 days'; *Tussilago farfara* germinated under water after 9 days, but the young plants kept alive for some time: the next worse germinators have been *Phlox Drummondii*, *Trifolium incarnatum*, *Linum usitatissimum*, and *Sinapis nigra*, very few of which survived 15 days' immersion.

From such scanty materials it is, perhaps, rash to draw any sort of deduction in regard to the power of resistance to salt water in the different divisions of the vegetable kingdom; but a few remarks may be permitted. Three out of the 17 Endogens and 20 out of the 70 Exogens were killed by a month or 28 days' immersion: this fact, together with the marked power of endurance in the *Atriplex*, *Beta*, *Spinacea*, and *Rheum*, lowly organized exogens, accords with, and is perhaps connected with, the fact, insisted on so much by M. A. DeCandolle, of the wider range of the Endogens and of the lowly organized Exogens, than of the higher Exogens*. The four *Solanaceæ* and two *Umbelliferæ* endured the salt water very well, and each included the longest survivor of all the species tried. Ten *Compositæ* were tried, and only one was killed by a month's immersion, that is excepting the *Tussilago* which germinated under water. Eight *Cruciferæ* were tried, and all withstood the influence well, excepting *Sinapis nigra*, which was killed by 25 days' immersion; three of the *Cruciferæ* survived 85 days: this power of endurance in the seeds of this family is, perhaps, surprising, considering the oil in their seeds. Nine *Leguminosæ* were tried; these all resisted the salt water badly, with the exception of the hard thin seeds of *Mimosa sensitiva*, which germinated pretty well after 50 days; three species of Lupine seemed just able occasionally to withstand about 36 days' immersion; the seeds of the other *Leguminosæ* having all been killed by much shorter periods. I suspect that it is the water, and not the salt, which kills the *Leguminosæ*; at least I found that a lot of fresh "Thurston Reliance" peas were all killed by 13 days' immersion in pure water*; and I have been assured that a much shorter immersion will kill kidney beans. Lastly, seven species of the allied families of *Hydrophyllaceæ* and *Polemoniaceæ* (six having been selected by Mr. Berkeley) were killed by a month's immersion, and so great a proportion can hardly be accidental.

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* Godron in his "Florula Juvenalis," p. 16, states that the seeds of some plants, as of *Atriplex* and certain *Gramineæ*, germinate perfectly in salt-marshes, where they have been immersed during all the winter under salt water.

From the great difference in the powers of resistance to the sea-water in the different families just specified, and even in the varieties of the same species; and from the *Leguminosæ* being apparently in this respect the tenderest, whereas they are generally believed to keep longer than any other seeds in a dry state, I think we may learn a lesson of caution, not to infer with too much certainty which seeds will endure longest when naturally buried in damp earth, from knowing what kinds will keep best in an artificial state.

I had intended trying many more seeds, as I at one time thought that these experiments would have thrown more light on the dispersal of plants than I now think they do. I soon became aware that most seeds, in accordance with the common experience of gardeners, sink in water; at least I have found this to be the case, after a few days, with the 51 kinds of seeds which I have myself tried; so that such seeds could not possibly be transported by sea-currents beyond a very short distance. Some few seeds, however, do float, as I have tried with some of those cast by the Gulf Stream on the coast of Norway. From knowing that timber is often cast on the shores of oceanic islands far from the mainland, and from having met with accounts of floating vegetable rubbish off estuaries, I assumed that plants, with ripe seeds, washed into the sea by rivers, landslips, &c., might be drifted by sea-currents during a period of some weeks. The closing of the capsules, pods, and heads of the *Compositæ*, &c., when wetted, and their re-opening when cast on shore and dried, the seeds being thus allowed to be driven inland by the first stormy winds, seemed to favour such means of transport. But in putting 34 plants of different orders, with ripe fruit, into salt water, one alone, the *Euonymus*, floated for a month, being buoyed up by its fruit; the others all sunk in 21 days, some in 5, and several in 7, 9, and 11 days. But I am not sure that I have made the trial fairly, for I kept the floating plants in too warm and dark a place, which might have favoured their decay. Finally I may remark, that the seeds of very few species are, as far as we yet know, all killed by 10 days' immersion,—that some plants will float for this period,—that the average rate of the ten currents in the Atlantic Ocean, given in Johnston's "Physical Atlas," is 33 miles per diem (the main Equatorial current running at the rate of 60 miles, and the Cape Stream at 80 miles per diem); and therefore I conclude, under the existing extremely scanty materials for forming any opinion, that some plants might under favourable conditions be transported over arms of the sea 300 or even more miles in breadth; and if cast on the shore of an island not well stocked with species, might become naturalized.

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* Loiseleur-Deslongchamps says (Consid. sur les Céréales, Part ii. p. 234) that in wheat put into water the embryo comes out in the course of two days; as Mr. Berkeley's wheat survived after 30 days' immersion in sea-water, one may suspect that in this case, the seed would survive longer under sea-water than under fresh water.

In the following list, to save repetition, I have marked the plants tried by Mr. Berkeley, and which germinated after a month's immersion, with †; when they did not germinate, this is expressly stated. The "cold water" refers to the seeds placed in salt water in the tank with snow.

I have arranged the families in accordance with Lindley's "Vegetable Kingdom."

ENDOGENS.

(GRAMINEÆ.)

Avena (common oats): after 85 days' immersion germinated excellently; after 100 days some germinated; after 120 days some half-germinated.

Hordeum (common barley): germinated well after 28 days, but none after 42 days; in the cold water well after 30 days (†).

†*Triticum* (wheat).

Phalaris Canariensis: after 70 days nearly all germinated; in another lot after 85, most of the seeds germinated, but the seedlings died off; after 100 and likewise after 120 days' immersion, in each case, a single seedling came up.

Holcus saccharatus: after 36 days germinated fairly; after 50 days all died.

†*Zea Mays*: none germinated after a month's immersion.

†*Arum maculatum.*

†*Anomatheca cruenta.*

†*Babiana plicata.*

†*Trichonema pudicum.*

†*Sisyrinchium iridifolium.*

Canna Indica: after 50 days several germinated, but not very strongly.

†*Colchicum autumnale*: did not germinate.

Allium cepa: after 56 days' immersion, 3 out of 15 germinated; after 82 days in the cold water, most of the seeds grew well; after 100 days, 2 or 3 grew out of about 25 planted (†).

†*Bulbine annua.*

†*Asphodelus luteus.*

†*Uropetalum serotinum*: did not germinate.

EXOGENS.

Ricinus communis (*var. major* and *minor*): both germinated after 36 days.

Cucurbita Melopepo (vegetable marrow): germinated after 100 days; of 4 seeds immersed in the cold water for 82 days, 2 germinated.

†*Cucumis Melo* (melon).

Cistus (mixed shrubby garden varieties): germinated well after 36 days, and some germinated after 70 days.

(CRUCIFERÆ.)

Lepidium sativum: after 85 days' immersion only one out of many germinated; after 56 days $\frac{6}{57}$ grew: in the cold water, after 65 days, $\frac{4}{60}$ grew. (†*var.*, golden cress.) These seeds gave out an astonishing quantity of slime in the salt water.

Brassica oleracea, var. "Mammoth white Broccoli:" germinated after 11 days' immersion, but after 22 days all died.

——— ———, *var.* "Early Cauliflower:" after 22 days, 5 out of 100 germinated; after 36 days all dead.

Brassica oleracea, var. "Cattell's Cabbage:" germinated excellently after 36 days; all dead after 50 days.

——— ———, *var.* growing wild on the Castle Rocks of Tenby; fresh seeds, after 50 days germinated excellently; after 110 days germinated very well; after 133 days only two out of some hundreds germinated (†).

†*Brassica Rapa* (*var.* yellow turnip).

Raphanus sativus: after 85 days, $\frac{2}{30}$ germinated; the cold water seemed to be injurious to these seeds, for after only 30 or 50 days all the seeds were dead (*var.* black radish) (†).

Erysimum Perowskianum: after 36 days germinated well; after 50 only one seed; after 70 days all dead (†).

Matthiola annua: germinated after 28 days; all dead after 54 days.

Sinapis nigra: seeds much swollen; germinated after 11 days; all dead after 22 days: *fresh* seed germinated pretty well after 15 [illegible]ays, but were all killed by 25 days' immersion.

Crambe m[illegible]tima: after 37 days germinated well.

Tropæolum majus: after 37 days nearly all germinated, but after 50 days none did.

†*Limnanthes Douglasii.*

Hibiscus Manihot: all were killed by 11 days' immersion (†).

†*Malope grandiflora.*

Papaver somniferum: germinated well after 28 days; was killed by 54 days.

Argemone Mexicana: came up excellently after 50 days, and pretty well after 70 days.

†*Chryseis crocea* (germinated very imperfectly after the month).

Linum usitatissimum: after 7 and after 14 days only two or three seeds, out of very many, germinated; after 28 only one seed came up; after 42 days not one germinated. These seeds gave out much slime.

†*Silene compacta.*

Rheum Rhaponticum: germinated well after 82 days.

Atriplex (garden orache): some of the seed germinated under water after 56 days' immersion; the remaining seed germinated excellently after 100 days.

Beta vulgaris: excellently after 100 days (†).

Spinacea oleracea: excellently after 70 days; a few after 120 days; all killed by 137 days (†).

(LEGUMINOSÆ.)

Vicia Faba (*var.* "Johnston's Wonder"): two out of six lived after 11 days' immersion; one half-germinated after 14 days; after 22 days all dead: many of these beans swelled greatly. I tried sixty after 28 days and found all dead. None survived 30 days in the cold water.

Pisum sativum: after 11 days some germinated; none survived 14 days; none survived 30 days in the cold water. Another lot of *fresh* seed ("Thurston's Reliance") all died after 12 days; none survived 30 days in the cold water. I found 13 days' immersion in pure water killed these latter fresh peas. (†None germinated.)

Phaseolus vulgaris (*var.* "early frame dwarf"): all died after 11 days' immersion; after 28 days' immersion, 80 were planted, but all dead. I tried another lot of *fresh* seed, but none of them resisted even 10 days' immersion; nor did they resist 30 days in the cold water: many of these seeds swelled much (†).

Trifolium incarnatum: all died after 11 days' immersion, and after 30 in the cold water. *Fresh* seed germinated excellently after 5 days' immersion, well after 12 days, and one single seed out of some hundreds germinated after 20 days. These seeds swelled much.

Ulex europæus: after 11 days germinated well; after 14 days two germinated; after 28 days all dead.

Lupinus polyphyllus: after 22 days, out of seven swollen seeds three germinated; seven others did not swell and were all dead; after 36 days' immersion one began to germinate and then died.

Lupinus luteus (pale *var.*): after 22 days $\frac{4}{12}$ lived; after 36 days' immersion $\frac{3}{18}$ germinated; after 50 days all dead.

†*Lupinus pubescens* germinated after a month, but Mr. Berkeley says the greater number were rotten.

Mimosa sensitiva: germinated excellently after 36 days' immersion, and pretty well after 50 days.

Geum coccineum (*var. splendens*): after 36 days germinated well, and after 70 days one single seed germinated.

Saxifraga incurvifolia: did not germinate after 30 days' immersion.

——— *aizoides*, nor did this species, but the seed was not very good.

(SOLANACEÆ.)

Capsicum annuum: after 137 days' immersion, 30, out of 56 planted, germinated well (†).

Solanum tuberosum: germinated excellently after 70 days, well after 100; all dead after 120 days.

——— *lycopersicum* (common tomato): one seed germinated after 22 days' immersion, the rest were killed by 36 and 50 days' immersion. († But Mr. Berkeley found that they germinated after a month.)

†——— *melongena.*

Convolvulus tricolor: after having been 7 days in the salt water, many of the seeds germinated, and the embryos came out of the husks: of those which did not germinate under water, one germinated after 36 days' immersion.

(Polemoniaceæ and Hydrophyllaceæ.)

Gilia tricolor († was killed by a month's immersion).

Phlox Drummondii: of old seed none germinated after 11 days; but of fresh seed, 3 out of many germinated after 15 days, and none after 25 days' immersion.

Eutoca viscida.
Nemophila insignis.
——— *atomaria.*
——— *maculata.*
——— *discoidalis.*

† None of these were found by Mr. Berkeley to germinate after a month's immersion.

Borago officinalis: a few came up after 14 days' immersion, one after 28 days, and none after 42 days.

†*Nolana grandiflora.*

Satureja (common savory): after 42 days, 3 seeds out of many germinated.

Campanula Pentagonia († did not germinate after a month's immersion).

†*Fedia graciliflora.*

†*Fedia* (corn salad).

(Compositæ.)

Lactuca sativa (common lettuce): after 56 days' immersion $\frac{1}{20}$ of the seed came up; after 85 days only one out of several germinated. Cold water had no marked effect, but after 65 days they germinated rather better than the others (†).

†*Cichorium Endivia.*

Galinsoga trilobata: germinated after 22 days.

Aster Chinensis (mixed German varietes): germinated after 28 days; all dead after 54 days' immersion.

Ageratum Mexicanum: after 100 days, one seed out of many germinated; at much shorter periods these seeds did not germinate well.

Leontodon Taraxacum: germinated excellently after 61 days' immersion; the seeds were fresh.

Tussilago Farfara: fresh seeds being placed in the salt water, after 9 days, many of them germinated under water. After 25 days, I took out some of the young plants and planted them: one grew. The germination of these seeds is the more remarkable, as this is not a sea-side plant.

†*Monolopia Californica.*

†*Oenia turbinata.*

†*Cosmos luteus*: did not germinate after a month's immersion.

Clarkia pulchella: germinated well after 28 days; was killed by 54 days' immersion.

†*Godetia rubicunda.*

†——— *Lindleyana* was killed by a month's immersion.

Apium graveolens (*var.* "Cattell's white"): after 137 days only 6 seeds out of some hundreds germinated; after 85 days the seeds germinated excellently; they did not appear to germinate quite so well after 82 days in the cold water (†).

Daucus carota: a very few germinated after 85 days; after only 56 days $\frac{3}{30}$ grew (†).

On the Vitality of Seeds after prolonged Submersion in the Sea.

By James Salter, Esq., M.D., F.L.S. &c.

[Read May 6th, 1856.]

I should not have thought the observations which are the subject of this little communication of sufficient importance to occupy the attention of the Linnean Society, had it not come to my knowledge that one of our most distinguished British naturalists is at present engaged in investigating experimentally the question of the vitality of seeds after prolonged submersion in sea-water, especially in reference to the influence which that circumstance would have in explaining some of the problems of geographical vegetable distribution.

The facts which I am about to detail, and which came accidentally under my notice some years since, bear directly upon this subject, and while, as it seems to me, they establish the doctrine that certain seeds *do* retain their vitality after submersion in the sea, probably for a considerable period, they suggest also, as far as these instances themselves are concerned, an explanation of the mode in which the seeds may have passed from one locality to another. The facts to which I refer are briefly these:—

In the year 1843, the authorities of Poole in Dorsetshire determined to deepen the channels of Poole Harbour to facilitate navigation. For this purpose a large number of ballast-lighter-barges were employed to scrape the mud from the bottom of the channels and convey it to the shore, where it was deposited in large quantities. During the winter sufficient mud was thus obtained to cover an area of some hundred square yards several feet in thickness, and this was accumulated to such an extent, that a quay was made of the hardened mud on the edge of the shore.

The quay however was never used, nor its surface disturbed.

Early in the following spring I was surprised to see that the surface of this harbour-mud exhibited abundant vegetation, of a character totally distinct from that of the neighbouring shore; and as the season advanced, and the species were recognized, the flora of this mud quay was not only found totally distinct from the littoral vegetation which surrounded it, but it contained plants which did not grow within many miles of the spot, and one which was probably foreign to the county. Immediately surrounding the mud quay was the ordinary vegetation of our southern harbour shores, *Statice*, *Salicornia*, *Atriplex*, *Carices*, &c., whilst on this exposed mud itself not one of them was to be seen; but instead of these there sprung up a large crop of oats and barley, some plants of *Lysimachia vulgaris*, one plant of *Centaurea calcitrapa*, and multitudes of *Epilobium hirsutum*; and besides these there were other plants which I did not recognize, or whose names I have forgotten.

To my mind it appeared conclusive, that the seeds which produced this crop of vegetation must have been in the mud at the time it was deposited on the shore by the lighters.

Taking the plants I have named as constituting part of the vegetation of this new-made land,—they none of them grew in its neighbourhood. The cereals, which constituted the most numerous of the plants, were not cultivated within a mile of the spot. This mud quay was made at the extremity of the peninsula upon which the town of Poole is built, and the nearest field upon which cereals are cultivated is on the other side of the town, and at least a mile from the shore.

Lysimachia vulgaris does not grow within four or six miles of the spot; *Epilobium hirsutum* two or three miles; and *Centaurea calcitrapa* is scarcely known in the county, and certainly not within ten miles of Poole.

Now remembering that none of these plants grew either on the shore around the spot, nor even within miles distant; remembering too that they were the sole occupants of this new-made land, and that the ordinary shore plants, growing in abundance only a few feet from its edges, were not to be seen on it, and further, that this abnormal vegetation showed itself the very next spring, even only a few weeks after it was completed, it must, I think, be conceded, that the seeds were in the mud at the time it was spread upon the shore; and that idea is still further sustained because a very possible explanation suggests itself, which would sufficiently account for the presence of the seeds of the plants named, in the situation from which the mud was obtained. The mud was collected in the main channel about midway between the head and the mouth of the harbour. At the head of the harbour two rivers pour their waters into it, the river Frome and the river Piddle. These rivers take their origin in the western parts of the county of Dorset, and in their course pass through districts having every variety of soil and capable of furnishing vegetation of great diversity; on their banks, moreover, two of the species I have mentioned (*Lysimachia* and *Epilobium*) grow in profusion.

Is it too much to suppose that the seeds from which these plants sprung had fallen into the rivers in various parts of their course, had gone with their waters into the harbour, and ultimately reached the position from which the mud and they had been collected? That explanation appears to me to be very probably correct; but whether it be received or not, the more important point,—that a variety of seeds had been for a period, probably considerable, at the bottom of Poole Harbour, soaking in water as salt as that of the ocean, had retained their vitality till brought under the influence of air and rain and warmth, and had then produced healthy vegetation—that is a point which I think cannot be disputed.

Note on the Development of Fungi upon Patna Opium. By the Rev. M. J. Berkeley, M.A., F.L.S. &c.

[Read June 3rd, 1856.]

Corda has figured in his fifth Fasciculus a species of *Periconia*, which was observed by Jänner on Opium from which the *Morphine* had been extracted. This, as far as I know, is the only recorded instance of vegetation on that substance, though there would be no reason for surprise, when moulds are developed so largely in mineral poisons, if they should not be incapable of growth in vegetable poisons. The stems and capsules of *Papaver somniferum* nourish more than one parasite; but it is probable, that in the condition in which they are when the fungi make their appearance, they contain very little opium.

Specimens of the shell of opium cakes, consisting of the petals of *Papaver somniferum*, agglutinated with an impure opium paste known under the name of Lewah, have just been transmitted to me by Dr. Thomson, to whom they had been communicated by Dr. Mackinnon from Patna, in consequence of an affection to which the opium cakes have been subject for the last year or more. One specimen consists of shell from a very perfect cake, the other from a cake in an advanced state of decay. On examination of the lewah between the layers of petals, with sesquichloride of iron, there was little or no red tint in either. Both so far seemed to be in the same condition. On examination with the microscope, the shell from the perfect cake exhibited a large quantity of pollen-grains attached to the surface, and abundant mycelium of *Penicillium*, with necklaces of spores of various sizes, but without any symptoms of consequent decay. The shell from the unsound cake was much decomposed. It was infested with *Acari*, whose eggs and dung were scattered about, mixed with a few pollen-grains. There were abundant traces of the same *Penicillium*, but not in so perfect a condition. There seemed also to be a mixture of the spores of *Aspergillus*, with copious sporangia of *Eurotium Herbariorum*, which is now recognized as a form of the fruit of that genus; besides which, there were little heaps of white matter, consisting of minute bodies endowed with Brownian motion, and numberless infant spores of some mould in various conditions, resembling the Yeast fungus, and possibly an early stage of the *Penicillium* or *Aspergillus*. In the former case mould was present, but not in such abundance as to do mischief; in the latter mould predominated, and was, I believe, the cause of the deterioration of the opium. Without more ample materials, it would be imprudent to conclude that the little mould in the first instance had robbed the lewah of its meconic acid, though it had done no damage to the mass of opium within, nor have I any specimen of the damaged opium itself for comparison.

Supposing however, which is very probable, that the injury to the opium has really arisen from the mould, the question is, how may it be remedied, and so remedied as not to impair the sample? It is obvious that dipping the cakes into any solution would be liable to objection, as probably leading to mischief. If, however, the cakes, as soon as any mould appears, were submitted to sulphurous acid (the vapour of common sulphur), I am inclined to think that the remedy would be complete, and that the cakes would not be injured in appearance. If the affection should become of any serious importance, the practice would be well worth trial, and I should be very sanguine of its success.

M. J. Berkeley.

King's Cliffe, April 26, 1856.

Supplemental Observations, in a Letter to J. D. Hooker, Esq., M.D., F.R.S., F.L.S. &c.

King's Cliffe, April 28, 1856.

My dear Friend,—I have made another chemical examination of the two specimens of Opium shell this morning, the result of which is as follows:—

Neither in the bad nor good the lewah in solution with water and alcohol gave any red tint with litmus paper. There is, therefore, no free meconic acid.

1. Sesquioxide of iron in a spirituous solution of the lewah gave no red tint in either. It should seem then, again, that there is no meconic acid. As, however, the solution was slightly discoloured with gallate of iron, the matter is not decisive. Meconate of iron may not have been formed, in consequence of the formation of gallate of iron.

2. Strong nitric acid gave a *slight* red tinge to a spirituous solution in both cases: there is, therefore, a small quantity of morphia in both.

We made a comparative trial with opium powder in the first instance (No. 1), and at once obtained a *strong* red tint even with an aqueous solution. Our examination, therefore, is to a certain degree worth attention.

We also made a comparative trial with opium powder, and obtained a decided red with a spirituous solution on the addition of strong nitric acid (No. 2). Our manipulation then, in this case, is not at fault.

Of course, no more weight is to be attached to such a rough chemical examination than it deserves, but it is at least suggestive.

Mould destroys the virtue of many drugs, and why not of opium? We ought to have had a portion of the opium from the cakes to which the two specimens of shell belonged.

M. J. Berkeley.

The lewah would naturally be deficient in meconic acid and morphia compared with good opium; but not probably so deficient as in the shell after moulds have grown upon it.

Note on the Recent Discoveries in relation to the Microgonidia of Freshwater *Algæ*. By the Rev. M. J. Berkeley, F.L.S. &c.

[Read April 1st, 1856.]

Amongst other points in the physiology of *Algæ*, on which so much light has been thrown by the beautiful observations of Pringsheim, the functions of the little organs which Braun has discovered in very different groups of freshwater *Algæ*, and to which he has given the name of *microgonidia*, have not been neglected. These bodies, which scarcely exceed $\frac{1}{800}$th of an inch in length, and are often not half that size, are clavate above and strongly attenuated below. They are either unicellular or divided by one or two septa, and occur in little groups or separately on or in the neighbourhood of the large spores. They soon attain their full development, and open by means of a little lid at their apex, through which their contents are rapidly evacuated. Pringsheim has observed in *Œdogonium* (*Vesiculifera*, Hass.) and *Bulbochæte*, that when the contents of the swollen joints in which the spores originate have been concentrated, a round lateral aperture in the former, and one or more circular fissures in the latter are formed, by means of which they are exposed to the entrance of minute bodies from without. As the microgonidia burst at the same time with the formation of these apertures, Pringsheim conjectures with great probability that they perform the same functions as the horn-like processes in *Vaucheria*. He has not, however, witnessed the production of spermatozoids from them. After the rupture of the spore-cells has taken place, the concentrated mass soon acquires an external membrane, exactly after the fashion of the spores in *Vaucheria*, and is in a condition to be separated at the proper time from the parent plant, to germinate, or to undergo farther changes instead of immediate germination. One of these bodies is figured by Thuret under *Œdogonium*, but he does not call any particular attention to them, nor does he seem to have observed them *in situ*.

After reading the paper of Pringsheim, I referred to a file of letters received some ten years since from Mr. Thwaites, and under the date of April 1846 I found a correct figure of the microgonidia in a species of *Œdogonium*, agreeing exactly with the account of Pringsheim, as does a mounted specimen received at the same time which is still in excellent condition. Mr. Thwaites remarks that these bodies appear to be of the same nature with the horns in *Vaucheria*, and that they are probably antheridia; but he was led aside from following the clue before him by theoretical views which in the end proved of far less importance. It is curious that he had not observed them also in *Bulbochæte*, for mounted specimens received from him about the same time exhibit them in great abundance. Mr. Broome, who was at that time the constant companion of Mr. Thwaites in his scientific pursuits, has at my request examined his own mounted specimens of *Bulbochæte*. He finds that *microgonidia* are equally abundant in them as in my own specimens, and has moreover transmitted sketches, which are now laid before the Society. There is no doubt that Pringsheim will follow up the question which he has so successfully begun; but as the season is just at hand for observing these bodies in perfection, I have thought that an especial notice of their observation some years since in England might be interesting to such Members as may not have met with Pringsheim's memoir.

The same author has, moreover, made some important discoveries as to the development of the spore in *Bulbochæte* after separation from the mother-cell. The spore, after remaining some weeks without much alteration, at length escapes, and in a few hours elongates, attaining twice its original length. The endochrome by successive division gives rise to four distinct bodies which acquire a nearly globular form and are furnished at one extremity with two sets of ciliary processes, by means of which they move about, and thus appear in the condition of zoospores. It is probable that some similar change may take place in *Œdogonium*. The observation of the spores, therefore, in this genus, after their formation or separation from their parent-cells, presents another interesting subject of investigation.

The species of *Bulbochæte* on which the microgonidia are figured by Mr. Broome, appear to be *B. setigera* and *B. crassa*. The two species at any rate are different, for while the spores of *B. setigera* measure ·003 in diameter, or $\frac{1}{333}'''$, in the other species they measure only ·0015, or $\frac{1}{666}'''$. On the threads of the former a little parasitic species is also figured, which I believe to be undescribed, and has been named by Messrs. Broome and Thwaites *B. parasitica*. Microgonidia have not been observed in this species; but the specimens are so entangled with the threads on which they grow, that it is not possible to obtain a very clear view. The sketches, it should be observed, are mere hasty sketches for the sake of illustration, and were made without the slightest notion of being laid before the Society.

On a New Species of *Peziza*, being the full Development of *Sclerotium roseum*, Kneiff. By FREDERICK CURREY, Esq., F.L.S.

[Read June 17th, 1856.]

THE genus *Sclerotium* is one which, for a long time, has occupied a doubtful position in the family of the *Fungi*. After having been bandied about from one family to another, the opinion has for some time been gaining ground, that the *Sclerotia* are not autonomous productions, but are merely the mycelia of other Fungi, which being arrested in their growth whilst retaining their vitality, await only a favourable season for attaining their full development. There are numerous instances in which, by the observation of them in their natural condition or by cultivation, the *Sclerotia* have been ascertained to produce Fungi of various kinds and belonging to widely different families, but there is still a vast number in which no such subsequent development has been traced, and which in the mean time are necessarily retained in the genus *Sclerotium*. Under these circumstances, any new case in which the full development is observed must be a matter of interest to mycologists, and I have therefore thought it worth while to bring before the notice of the Society the following instance. The *Sclerotium* to which I allude is *Sclerotium roseum*, Kneiff., which is found in the interior of the stems of Bull-rushes and common rushes, the pith of which it partially displaces. The fungus is oblong and almost cylindrical in shape, usually somewhat rounded at both ends, and varying in length from $\frac{1}{8}$th to $\frac{1}{2}$ an inch and upwards. Its surface is marked with longitudinal furrows, and I have observed that the fibres of the interior of the rush fit closely into these furrows. Like many other *Sclerotia*, its outer surface is formed of a layer of dark-coloured cells, making the body appear black to the naked eye, but which cells, when seen under a sufficient magnifying power, assume a brown hue. The internal cellular tissue is almost white, but with a decided tendency to rose-colour, a circumstance which has given rise to the specific name "*roseum*." It is worthy of remark that if a thin transverse section be placed under the microscope, it is seen to consist of a mass of densely packed thread-like cells which constitute the substance of the *Sclerotium*, and intermixed with these cells there is to be seen a quantity of the well-known stellate cells forming the pith of the rush. This fact shows that the *Sclerotium* has not altogether displaced the pith, but has grown round it, cutting off, and as it were incorporating with itself, a portion of such pith.

It was on the 23rd of April in the present year (1856), that in searching for Algæ in a pool on Paul's Cray Common, near Chislehurst, in Kent, I met with several specimens of a very elegant *Peziza* growing upon the last year's stems of some species of Rush, probably *Juncus conglomeratus*. Upon a closer examination I observed that the *Peziza* was not attached to the surface of the rush, but had emerged from the interior, causing a longitudinal fissure in its passage from within outwards; and upon splitting open the rush, a black tubercular body was visible which proved to be *Sclerotium roseum*, to which the stalk of the *Peziza* was attached, and from which in fact it grew. The cup was of a bright brown colour, varying somewhat in shape; in most of the specimens it was hemispherical, but in some cases infundibuliform; in one the edge of the cup was erect, extending beyond the equator of the hemisphere, and calling to mind the peculiar shape of *Peziza Persoonii* as figured in the 'Mycologia Europæa;' in other specimens the edge of the cup was recurved and sinuous. The number of *Pezizæ* growing from each *Sclerotium* varied from two to thirteen, and the greater the number the less was the size of each individual. The diameter of the largest cup was rather more than one-half, and of the smallest about $\frac{1}{16}$th of an inch. The stalk was well developed, being generally about the length of the diameter of the cup, of a darker colour than the cup, and tapering somewhat from above downwards. In one specimen the base of the stalk at its point of junction with the *Sclerotium* was thickly covered with hairs.

The *Peziza* described has not been hitherto observed, but there is another well-known species which also grows from a Sclerotioid base to which it bears a considerable resemblance, viz. *Peziza tuberosa*, Bull. The cup of the latter generally grows to a larger size, and its stalk is usually much longer, but the two plants are so alike in shape and colour, that there might be some difficulty in distinguishing small detached specimens of *Peziza tuberosa* from large specimens of the new *Peziza*;—I say *detached* specimens, because the habits of growth of the two Fungi are so dissimilar that they could never be confounded in their natural habitats. *Peziza tuberosa* grows on the ground, its cup just appearing above the surface, and its stalk with the tuberous extremity being buried sometimes to the depth of upwards of 2 inches in the earth. The other, having its nidus in the interior of rushes on the edge of a pool, grew almost, I may say quite, in the water. Another important mark of distinction is to be found in the spores, those of *Peziza tuberosa* being elliptical, whilst those of the rush-*Peziza* are narrow, and more or less arcuate. In conclusion I may mention that there is another *Sclerotium* (*Sclerotium sulcatum*, Desm.), which grows in the interior of the stems of *Carices*, just as *Sclerotium roseum* does in the interior of rushes. It has lately been observed by M. Durieu de Maisonneuve, that *Sclerotium sulcatum* under favourable circumstances becomes (like *Sclerotium roseum*) developed into a *Peziza*. I have not seen this latter *Peziza*, and am indebted to M. Tulasne for a notice of the fact.

My friend Mr. Berkeley, to whom I sent specimens, has marked my plant in his herbarium "*Peziza Curreyana*," and has requested me to adopt that name.

Description of the Kobo-tree, a new genus of *Leguminosæ*, collected by Dr. W. F. DANIELL, F.L.S., in Sierra Leone. By JOHN JOSEPH BENNETT, Esq., F.R.S., Sec. L.S.

[Read November 4th, 1856.]

GUIBOURTIA, *Benn.*

CHAR. GEN. *Calyx* bibracteatus, 4-sepalus; sepalis deciduis. *Corolla* nulla. *Stamina* 10, libera, æqualia. *Ovarium* compressum, pauci- (2–4-) ovulatum; stylo filiformi; stigmate obtuso. *Legumen* ——.—Arbor Africæ Occidentalis, *Hymenææ facie.* Folia *bifoliolata, foliolis* 3–5-*nerviis.* Paniculæ *terminales*; floribus *in ramulis ultimis approximatis, sessilibus, inconspicuis.*

This new genus belongs to the Suborder *Cæsalpineæ,* and is evidently very nearly related on the one hand to *Copaifera* and *Cynometra,* and on the other to *Hymenæa, Trachylobium* and *Peltogyne.* It differs from the three latter genera in the total absence of petals, in the complete suppression of the tube of the calyx, and in its closely approximated sessile flowers. In these particulars it approaches *Copaifera,* from which it is technically scarcely to be distinguished by any other character than the remarkable one of its two large persistent lateral bracteæ, and by its bifoliolate leaves; which last-named peculiarity is, however, found in one or two species of *Copaifera.* It thus forms a connecting link between *Hymenæa* and its subdivisions on the one hand, and *Copaifera* and *Cynometra* on the other. As one of the trees producing a valuable kind of Copal, it cannot be more appropriately dedicated than to the learned Pharmacologist to whom we are indebted for so many elaborate investigations into the origin and history of substances used in Medicine and the Arts.

GUIBOURTIA COPALLIFERA, *Benn.*

Habitat in Africâ Tropicâ Occidentali, apud "Goderich" et "Lumley."

Descr. Arbor, comâ ut videtur densâ; ramulis ultimis molliter pilosiusculis, densè foliatis. Folia petiolo vix semiunciali crassiusculo insidentia, bifoliolata; foliolis sessilibus, falcato-semiobovatis, latere interiori plùs minùs concavo, acumine brevi obtuso plerumque terminatis, glaberrimis, coriaceis, plerumque opacis sed aliquandò evidenter pellucido-punctatis, a basi 3- vel rariùs 5-nerviis, nervis venisque crebris subtùs prominentibus reticulatis. Inflorescentia terminalis, e spicis numerosis in paniculam brevem densam dispositis. Spicæ, vel paniculæ ramuli, 1- 2-pollicares; rachibus crassiusculis, velutino-tomentosis. Flores sessiles, approximati; juniores bracteâ subtendente concavâ, ovatâ, acutâ, velutino-tomentosâ, margine ciliatâ, alabastro longiore, citò caducâ, stipati et occlusi. Calyx bibracteatus, bracteis lateralibus coriaceis, subrotundis vel truncatis, nervo carinatis, glabriusculis, alabastro ovali quadruplò brevioribus, persistentibus. Sepala 4, 2 posteriora nempè in unicum coalita; æstivatione imbricata, anticum scilicet omninò exterius, alterumque e lateralibus omninò (carinâ exceptâ) interius; coriacea, subæquilonga, latitudine inæqualia, subovalia, obtusa, glabra, pellucido-punctata, decidua. Petala nulla. Stamina 10, omninò libera, æqualia, disco inconspicuo in calycis fundo breviter piloso inserta; filamentis in æstivatione medio inflexis, flore aperto sepalis duplò longioribus, exsertis. Antheræ omnes fertiles, subæquales, lineari-oblongæ, versatiles. Ovarium e basi attenuatâ inæquilateraliter ovoideum, compressum, 2–4-ovulatum; stylo ejusdem ferè longitudinis, in alabastro spiraliter involuto; stigmate obtuso. Legumen ignotum.

Extract of a Letter from THOMAS C. ARCHER, Esq., dated "Liverpool Royal Institution, 20th Nov., 1856," to THOMAS BELL, Esq., Pres. L.S.

[Read December 2nd, 1856.]

IN one of the newspaper reports of a recent meeting of the Linnean Society, I read with much interest some remarks by Dr. W. F. Daniell on the Kobo-tree of Sierra Leone (*Guibourtia*, Bennett). To the observations of Dr. Daniell, I can add one or two which may be acceptable to your botanical Members.

The gum-resin which Dr. Daniell speaks of as being collected from *Guibourtia copallifera* is probably one of three kinds which are very largely imported into Liverpool under the names of African Copal, African Yellow-gum, and African Red-gum, specimens of which I shall have much pleasure in forwarding to you if they would be acceptable. They differ very much in appearance, and I believe in value. The first is in rounded tears of variable size, but usually large, often very transparent, but rather dull on their surfaces; the colour a pale straw-yellow. The other two are in masses which are fragmentary in appearance, the yellow one usually less so than the red; the latter is often rendered yellowish in colour by adherent dust. The yellow sort is often semi-opaline from a milkiness which exists in some of the masses. I have seen one piece (evidently only a portion of a gigantic *tear*) which weighed nearly three pounds. The usual size of the fragments is that of a hen's egg. The colour of the red kind is rather redder than the oriental topaz, and may be called a reddish-yellow. The *quantity* of these gums received in this port is enormous, when we reflect upon the labour required for the collection of such products: more than 150 tons were imported in 1855; the whole of which I believe is consumed in the manufacture of varnishes, under the general name of Copal.

Trusting these remarks may not be out of place,

I remain, dear Sir,

Yours faithfully,

THOS. C. ARCHER.

On the Palm of Timbuctoo. By Berthold Seemann, Esq., Ph.D., F.L.S. &c.

[Read November 18th, 1856.]

Until lately, all our knowledge of Timbuctoo was very unsatisfactory. A mysterious haze was closely associated with the very name of that place, opening a field for the exercise of the imaginative faculties, the more unbounded as the veracity of those who had visited and described Timbuctoo was very much doubted; the doubts arising chiefly from the descriptions given, which in order to find general credence were either too vague, or when more positive, too much opposed to well-ascertained facts. Thus, for instance, it was stated that the Cocoa-nut Palm grew there; but as that tree, though found, according to J. D. Hooker, as far inland as Patna in Bengal, and, according to Humboldt and Bonpland, in New Granada, nearly a hundred leagues up the River Magdalena, is essentially a littoral plant, which refuses to grow in many countries any distance from the sea, the correctness of the statement was called in question, and the Palm of Timbuctoo remained until this day a botanical enigma.

In September 1853, Dr. Henry Barth succeeded in reaching Timbuctoo, and during a stay of several months obtained an intimate knowledge of the place and its productions. On his return to Europe, I asked that enterprising explorer whether the Palm alluded to was actually the Cocoa-nut tree. He replied in the negative, and at the same time informed me that it was the same which our mutual friend Edward Vogel had met with on the Lake of Tuburi, and described in his letter to Petermann, dated Kuka, July 13, 1854 (Bonplandia, vol. iii. p. 13). In that letter, Dr. Vogel mentions that he takes the Palm described by him to be the same as that discovered in Sennâr by Russegger's Expedition. Now, in submitting, during my stay at Vienna, all my evidence, including a letter received from Dr. H. Barth, to my friend M. Theodore Kotschy, the botanist of Russegger's Expedition, he agreed with me that Vogel was right in his conclusion, and that the whole of Barth's description corresponded with what he knew of the Palm. Having thus ascertained that the information I had collected referred to one and the same plant, the next step was to find out the genus to which it could belong. It must be borne in mind that I had no specimens at my disposal; Vogel, it is true, had sent a few fruits, but the box containing them has not come to hand*,—and the chief thing I had to guide me was the description given in Vogel's letter, in which it is stated that the fruit is from 8–9 inches long and from 6–7 in diameter, weighs about four or five pounds, has an oval shape, and a fibrous husk enclosing three seeds; that the trunk is, unlike that of the Doom-palm, undivided, and the leaves fan-shaped, characters which agreed with no other genus than *Borassus*; and on turning to Martius' great work, I find the palm described as *Borassus? Æthiopum*, Mart.

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* Since this paper was read the box has arrived at Kew, and the fruits prove to be those of *Bonassus*? *Æthiopum*, Mart.

It was necessary to show the way and the means by which I have arrived at the identification of the Palm of Timbuctoo with *Borassus? Æthiopum*, Mart., in order to gain the assent of botanists to it, and I will now proceed to condense and connect all the information I have collected, that we may see the sum total of what is known about this palm. Like *Adansonia digitata*, *Hyphæne Thebaica*, *Kigelia pinnata*, and many other plants, the *Borassus? Æthiopum* is spread from the eastern to the western shores of Africa, and has, by some, been thought to extend as far as the Cape de Verd Islands; but Dr. Bolle, from personal observation, assures me that the *Borassus* occurring on that group in isolated specimens is the old *B. flabelliformis*, Linn., as correctly stated by J. A. Schmidt in his Contributions to that flora (Beiträge zur Flora der Cap-Verdischen Inseln, Heidelberg, 1852), and that it was introduced by the Portuguese from the East Indies. *B.? Æthiopum* has been found in Nubia, on the Senegal, and in the territories of the Fidaëes; Ed. Vogel observed it on the Lake of Tuburi; and Barth adds: "It is diffused over the whole of Central Africa, and forms, especially on the banks of the shallow water-courses, so numerous in that country, extensive forests; at any distance from such waters it is only found in isolated specimens, and sometimes it is met with in company of the Date- and the Doom-palm. It is the most characteristic tree, not only in the Musgoo-country (*i. e.* the fertile, slightly elevated plains between the Shary and the eastern tributaries of the so-called Niger), but also in all the southern tributary provinces of Bagirmi; in Wadai, especially on the Bat-ha, as well as in Darfur and Kordofan, it is abundant. On the central Niger it is scarce; in Haussa very much isolated; but on the Upper Niger, above Timbuctoo, it is again plentiful, and has there been mistaken for the Cocoa-nut Palm. In the language of the Haussa-people it is termed 'Giginña,'—in Kanuri, that of the Bornuese, 'Kamelútoo,' in that of Fulbe, 'Dugbi,' in that of the people of Logon, 'Margum,' and in the Musgoo-language, 'Uray.'" In Nubia it is known by the name of 'Dolaib,' 'Delaib,' or 'Deleb,' on the Senegal by that of 'Runn,' and amongst the Fidaëes by that of 'Vige-Tjo.'

The trunk is about 2 feet in diameter, and according to Ed. Vogel 40, according to Thonning from 60–70, and according to Barth from 60–80 feet high. It is undivided, unarmed, and shares with *Iriartea ventricosa* and several other palms the peculiarity of having above its middle height a very perceptible swelling. Kotschy informs me that this swelling does not remain fixed in the particular part in which it makes its first appearance, but that, as the plant grows higher, it shifts its position, draws in, and appears in another place. Judging, however, from what I know of *Iriartea,* I do not see how it is possible for this hard woody swelling to become contracted; perhaps it may be that the part below the ventricose extension increases so much in thickness that the swelling itself becomes obsolete, and that a new swelling appears.

The foliage, forming a magnificent crown at the end of the trunk, is, according to Ed. Vogel, of a more lively green than that of the Ginger-bread-tree or Doom-palm, and is composed of fan-shaped leaves, measuring 5 to 12 feet in diameter. They are used for thatch, for making baskets, mats, hats, and other articles for which the leaves of most palms are usually employed. The palm is polycarpæous,—the inflorescence appearing between the leaves, bearing large bundles of almost round fruits, about as large as a common-sized melon, of a dark-yellow colour, and about four or five pounds in weight. The fruit has three seeds, surrounded by a fibrous husk which contains a pulp, of an acid sweet (according to Ed. Vogel, rather bitter) flavour, and an agreeable odour resembling that of the pine- or the Mamey-apple, on account of which (the fruit being either raw or boiled) the natives eat or rather suck it. The seeds are planted in the ground. In about a fortnight seedlings have sprung up, which are eaten, either roasted or raw. Barth states that he never saw them eaten in any other state than raw, in the parts he visited. "I am inclined to believe," says the last-named traveller, "that a well-known flour, called 'fidogma,' in the southern provinces of Bornoo, is derived from their root." The albumen of the seed, when still soft, is likewise eaten.

It is curious to find this palm applied to the same uses in Africa, as its congener the Palmyra (*B. flabelliformis*, L.) is in Asia, especially the sucking of the husk of the fruit, the eating of the young seedlings, and the extracting from the latter (as most probably is the case) a kind of flour. Now there may not be anything peculiar in the way in which the fruit is eaten, as that would readily suggest itself to anybody wishing to partake of it; but there *is* something peculiar in eating the seedlings, to say nothing of the extraction of flour from them. Here the question involuntarily arises: "Is the idea of eating them of native growth, or has it been derived from the East Indies?" I am not inclined to give the negroes much credit for inventive genius, but I think in this instance we must assign it to them. For if the applications of this palm had been adopted from the Palmyra, it is not likely that the most useful one of them, the extracting of toddy for making wine, vinegar, yeast, spirits and sugar, would have been overlooked. But neither of the *B.? Æthiopum* nor of any other African palm do I find it recorded that they serve for that purpose; all we hear is, that the date-tree in Northern Africa, after the heart of its leaves has been cut out, accumulates a thick, sweetish, and refreshing sap ("Lagbi"), of a slightly purgative tendency; and that the ancient inhabitants of the Canary Islands, the Guanches, knew how to prepare from it a beverage, which replaced the grape wine, and also vinegar, honey, and sugar; but that branch of industry has long since become extinct, and even the method by which the sap was obtained has not been handed down to us: as we are informed, however, by Viera, that each tree yielded about a small caskful, it is not impossible that it may have been procured as it is still in Northern Africa, and that whenever sap was required, at least one tree had to be sacrificed. The extraction of toddy seems to be peculiarly Asiatic: in America it is unknown, for the so-called "palm-wine" of that country is not obtained by means of the spadix from a *living tree*, as is the case with genuine toddy, but by a hole cut under the crown of a tree *previously felled*. Thus we find that all the three continents, chiefly inhabited by these princes of the vegetable kingdom, practise one principal method of extracting the saccharine matter in which many of the palms abound. Both the Africans and the Americans kill the tree, the sap of which they procure, the former by destroying its terminal bud, the latter by felling its trunk: only the Asiatics preserve it by merely cutting its spadix, and allowing the sap to ooze out through the wounded parts. The wanton destruction of the trees by the one party, and the careful husbanding of them by the other, is the reason why Africa and America have never furnished, and as long as the present process of destruction is continued, will never furnish any palm-sugar, a product of which Asia sends to Europe alone several thousand tons annually.

Note on the Use of the Rhizoma of *Pteris aquilina* as an Article of Food. By the Rev. M. J. BERKELEY, M.A., F.L.S. &c.

[Read December 16th, 1856.]

THE rhizoma of *Pteris aquilina*, which abounds in starch and mucilage, is sometimes used in Europe and Siberia to make a coarse kind of bread. This circumstance is mentioned by Houttuyn in his edition of the 'Systema Plantarum' of Linnæus, adverting at the same time to the report of Forster, that the New Zealanders derive a large portion of their food from roasted fern-roots pounded between stones, the woody matter being rejected as useless. He expressly says, however, that the fern so used is not *Pteris aquilina*, but *Acrostichum falcatum*, Linn. Houttuyn has, however, made some mistake in this, as *Gleichenia Hermanni*, and not *Gleichenia furcata*, a West Indian species, is the plant mentioned by Forster under the name of *Polypodium dichotomum*, which, after all, is a very doubtful native of New Zealand. It is now, however, well known, not only that several species of Fern in New Zealand afford an esculent rhizoma, but that amongst them is a species of *Pteris* so like *P. aquilina*, that it is considered merely a variety of that species under the name of *esculenta*. Having lately had occasion to examine the rhizoma of our common Bracken, it became a matter of interest to ascertain what sort of food might be afforded by it. I accordingly roasted some of the rhizomata, and found them eatable, but extremely disagreeable from their slimy consistence and peculiar flavour, in both of which respects they precisely resemble ill-ripened Brinjals. It struck me, however, that they might afford a better food, if the slimy matter could be removed. I accordingly scraped some of the rhizomata, which had first been washed and peeled, avoiding, however, the two columns of hard coloured tissue with which they are threaded, and then placed the pulp thus obtained in water. After four-and-twenty hours, the water had become extremely slimy and of a yellow-brown. This was carefully decanted, and the pulp washed again with water, which was now quite colourless. This also was decanted, and the pulp, when sufficiently dry, was kneaded into a cake, and baked upon the hearth. The result was a coarse but palatable food, perfectly free from any disagreeable flavour,—much better indeed to my taste, and probably not less nutritious, than Cassava bread.

In laying this note before the Society, I do not make the slightest pretension to novelty. The only interest which it may be supposed to possess, is the confirmation of the views, so far as the nutritive qualities of the two ferns in question go, which consider the New Zealand Bracken as belonging to the same species with our own.

Bread is said to be made of the roots of *Pteris aquilina* in Normandy and Siberia. Wahlenberg, however, states that, as far as he has seen, the plant is confined to one locality in Lapland. It is mentioned by Pallas in his 'Iter Sibiricum.'

On some Entomogenous *Sphæriæ*.

By the Rev. M. J. Berkeley, M.A., F.L.S.

[Read Nov. 4th, 1856.]

No country in the world seems to abound more in *Fungi* than the United States. I have something approaching to 5000 species in my Herbarium from two or three of the Southern States alone, and it is quite certain, from the new forms which are constantly occurring, that the number is far from being exhausted. Many of the species are identical with European forms, but there is a considerable number which have at present occurred nowhere else. Amongst the most curious and interesting of these are the entomogenous species of which I now lay a short description before the Society. None of these are completely isolated from the rest, for *Cordyceps palustris* resembles *C. sobolifera*; *C. stylophora* and *acicularis* are connected through *C. Ravenelii* with *C. sinensis*; and *C. armeniaca* calls to mind the apricot-coloured *C. myrmecophila*. Besides these species I have received *C. militaris* from South Carolina, where *C. entomorrhiza* also occurs under a very fine form.

The entomogenous species of *Cordyceps*, as at present known, are distributed as follow:—

2. *C. militaris* and *entomorrhiza* are common to Europe and the United States.
1. *C. myrmecophila* is found in England and Italy.
1. *C. gracilis* in Scotland and Algiers.
1. *C. sinensis* in China, where it is used as a drug.
2. *C. Gunnii* and *Taylori* in Australia.
2. *C. Sinclairii* and *Robertsii* in New Zealand.
2. *C. racemosa* and *falcata* at Myrong in the Khazia Mountains of Bengal.
1. *C. armeniaca* in South Carolina.
2. *C. sobolifera* and *sphecocephala* in the West Indies.
1. *C. larvata* in Cayenne.

Eight species therefore belong to temperate climates, descending however occasionally to warmer regions, and seven to tropical or subtropical. Of the first eight, four belong to those temperate parts of the Southern Hemisphere which often exhibit subtropical species of Fungi. The Entomogenous *Sphæriæ*, then, on the whole predominate in warm or equable climates.

One doubtful entomogenous species, *C. bicephala* from Brazil, has been omitted in the foregoing list.

1. CORDYCEPS ARMENIACA, *Berk. & Curt.*; armeniaca, stipite flexuoso breviusculo, capitulo e peritheciis asperulo pallidiore. *Curt.* no. 3774. (*Plate* I. *fig.* 1.)

Apparently on the excrement of birds, but probably on larvæ contained in it. Society Hill, South Carolina.

Apricot-coloured. Stem $\frac{1}{3}$ inch high, flexuous, sometimes twisted, paler than the head, which is subhemispherical and rough with the ostiola. Asci elongated, with a swollen apex; sporidia immature.

This species has some points in common with *C. myrmecophila*, but it is a shorter and far more robust plant, with a differently shaped head.

2. CORDYCEPS ACICULARIS, *Ravenel*; fusca, stipite gracili elongato, capitulo cylindrico apice sterili acuminato longiore; peritheciis superficialibus liberis. *Rav.* no. 1276. (*Plate* I. *fig.* 2.)

On caterpillars buried in the soil in damp shady woods. South Carolina. Summer. *H. W. Ravenel, Esq.*

Stem 3 inches or more high, not half a line thick, brown below and tomentose, smooth above and tawny, grooved when dry. Head $\frac{3}{4}$ inch long, cylindrical, brown, studded with the free perithecia, above barren and acuminate. Asci very long, flexuous; sporidia linear, breaking up into truncate joints $\frac{1}{5000}$ or more rarely $\frac{1}{10000}$ inch long.

This species is closely allied to *C. Ravenelii*, but the habit is very different. I can find no essential difference in the fruit.

3. CORDYCEPS STYLOPHORA, *Berk. & Broome*; fulva, stipite gracili, capitulo in stylum producto subæquali; peritheciis immersis. *Rav.* no. 1325. (*Plate* I. *fig.* 3.)

On larvæ buried in rotten logs. South Carolina. Autumn. *H. W. Ravenel, Esq.*

Stem $\frac{1}{2}$–$\frac{3}{4}$ inch high, $\frac{1}{4}$ line thick, smooth, about as long as the cylindrical head, which is produced into an acuminate sterile process as long or longer than itself; perithecia immersed.

I have not seen the ripe asci of this species, which appears to be quite distinct from either of the foregoing or subsequent species. All three occur on different larvæ, and in different situations.

C. entomorrhiza differs from all in the far longer articulations of the sporidia.

4. CORDYCEPS RAVENELII, *Berk. & Curtis*; fusca, stipite elongato flexuoso sulcato compresso glabriusculo, capitulo cylindrico attenuato longiore; peritheciis superficialibus. *Curt.* no. 3080, *Rav.* no. 1272. (*Plate* I. *fig.* 4.)

On larvæ of *Ancylonycha*, Dejean, or *Rhizotrogus*, Latreille, buried one or two inches in the earth. Spring and Summer. South Carolina. *Rev. M. A. Curtis* and *H. W. Ravenel, Esq.*

Brown. Stem 2 inches or more high, flexuous, compressed or grooved, at first minutely tomentose, at length smooth; head ¾ inch long, cylindrical, but slightly attenuated at either end. Perithecia free, ovate; asci very long; sporidia very long, filiform, breaking up into joints $\frac{1}{10000}$ of an inch long.

This species has very much the habit of *C. sinensis*.

5. CORDYCEPS PALUSTRIS, *Berk. & Broome*; carnoso-suberosa, sordidè carneo-fusca; stipite cylindrico sursum bifido trifidove, capitulis clavatis subcylindricis ex ostiolis asperulis; sporidiis filiformibus in articulos minimos globosos solvendis. *Rav.* no. 718. (*Plate* I. *fig.* 5.)

On moist putrid logs, undoubtedly attached to larvæ. Northampton Swamp, South Carolina. May. *H. W. Ravenel, Esq.*

From 1–2 inches high, about half as much when dry, of a dull brownish-purple or flesh-colour; carnoso-suberose; stem cylindrical, pulverulent, divided above, about as long as the clavate head, but scarcely so thick. Head rough with the mouths of the globose perithecia. Asci long, flexuous, filled with moniliform strings of globose, extremely minute grains, at length discharged in the form of white flocci. Articulations of the sporidia not exceeding $\frac{1}{20000}$ of an inch in diameter.

The extremely minute articulations or sporidiola, without any other character, separate this curious species, which has moreover a peculiar habit.

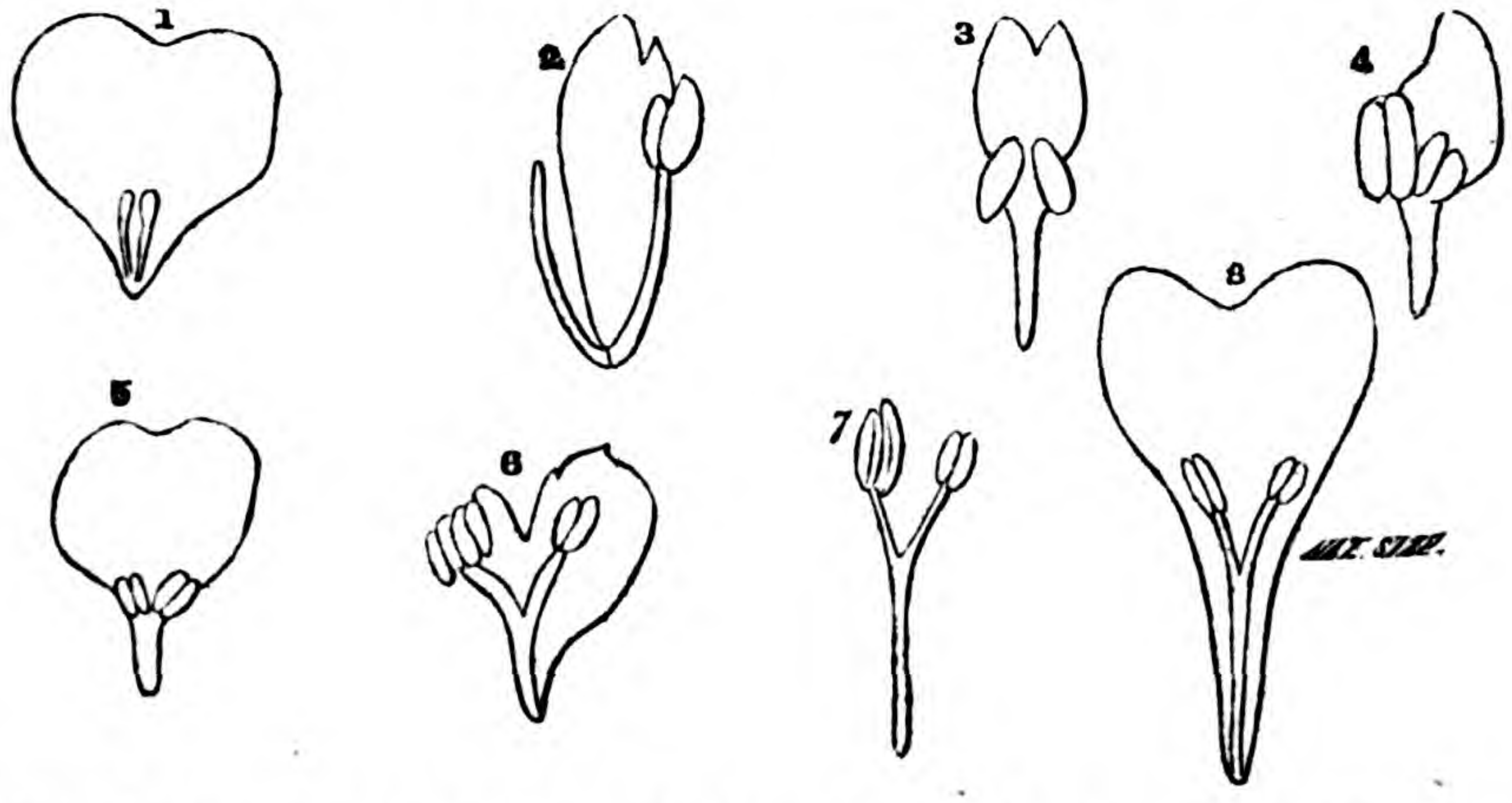
Note on a Monstrosity of the Flowers of *Saponaria officinalis*, L. By MAXWELL T. MASTERS, Esq. Communicated by the Secretary.

[Read Nov. 18th, 1856.]

MUCH discussion has from time to time arisen among Morphologists, as to the exact nature of the scales found on the petals of so many of the *Caryophylleæ*. The early botanists were content to call them nectaries, scales of the corona, appendages to the petals, &c., without attempting to explain them further. M. Dunal and the supporters of the theory of transverse chorisis, consider them to afford good illustrations of that process. This notion has also the support of Dr. Asa Gray, who institutes a comparison between the combined intrapetiolar stipules of *Melianthus*, and the two-cleft adnate appendages to the petals in the *Caryophylleæ*. Another view is that taken by a writer in Hooker's Journal of Botany for 1849, where they are considered to be in most cases deformed glands, the writer adducing, among other reasons for so considering them, the fact of "their gradual passage into anthers in some flowers," in accordance with his notion that the formation of anthers is due to the conversion of the glands of the staminal leaf into those organs.

Without wishing to enter into the question of the morphological import of the so-called glands in general, the object of the present communication is to bring forward evidence to show that the scale on the petals of the *Caryophylleæ* is in reality a double organ, consisting of two abortive stamens united together. The double nature of the scale is very manifest. In *Dianthus* there are two plates projecting from the claw of the petal. In most of the species of *Silene* the two plates are quite detached one from the other, and from the petal itself at the point of junction between the claw and the blade; hence in systematic works the appendage is described as bifid, while in some species, as *S. cerastoides*, *Cucubalus bacciferus*, &c. &c., the appendage is quadrifid,—an indication, as it were, of two two-lobed anthers. The double nature of the scales is almost equally obvious in the flowers of the *Sapindaceæ*, particularly in certain species of *Cupania* and *Urvillea*.

In some young flower-buds of a semi-double variety of *Saponaria officinalis* that have recently been examined, the scales were found in some instances to be completely divided into two strap-shaped bodies, standing in front of the petal, and quite distinct from it. In one example the scale, single below, was bifurcated above, each subdivision bearing an anther. Several similar scales were found



adherent to the claws of the petals. There were also numerous cases showing an intermediate condition between the ordinary scale and that of two distinct stamens—some of these are drawn in the sketch given below. A careful inspection of some very young flower-buds showed that these scale-like stamens, though formed subsequently to the petals, yet advanced more rapidly in their development than the petals, from which in the first instance they were perfectly distinct.

From these circumstances it seems fair to infer that the scales on the petals of the *Caryophylleæ* are composed of two abortive stamens united together, and in consequence that these bodies do not constitute any real exception to the laws of alternation.

The nature of the scales of the flowers of the species of *Cuscuta* has been explained by Mr. Babington in the Annals of Nat. Hist. for 1844 in a similar way, but he does not adduce any positive evidence in support of his opinion.

The flowers of *Saponaria* above alluded to afforded instances of both marginal and free central placentation. In the sketch are represented cross sections of two ovaries (figs. 1, 2), each consisting of two carpels, and in each there is an evident connexion between the placenta and the walls of the ovary. Other bi-carpellary ovaria, examined at a more advanced period of development, presented a central ovuliferous column, apparently quite unconnected with the walls of the carpels. The most frequent condition of the ovary was that in which there were three carpels, slightly united at their bases, but distinct one from the other for the greater part of their length, open along the ventral suture, and bearing ovules on their margins, as is shown in transverse section in the sketch (fig. 3). Figure 4 shows one of three carpels; the other two bore marginal placentæ, but in this one there was an ovuliferous cord, free from the margins of the carpel, but connected with the style, which is inflexed. Here it seems as if the two placentæ had become detached from the margins of the carpel during growth, while they had remained in union one with the other.

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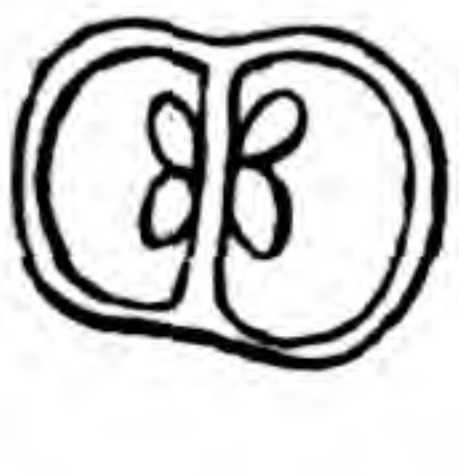

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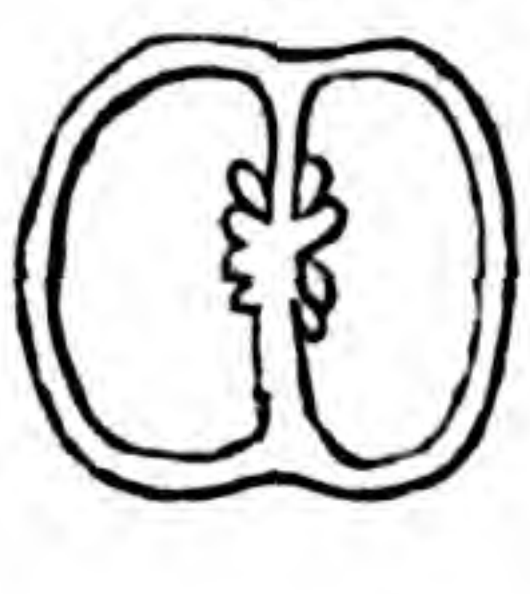

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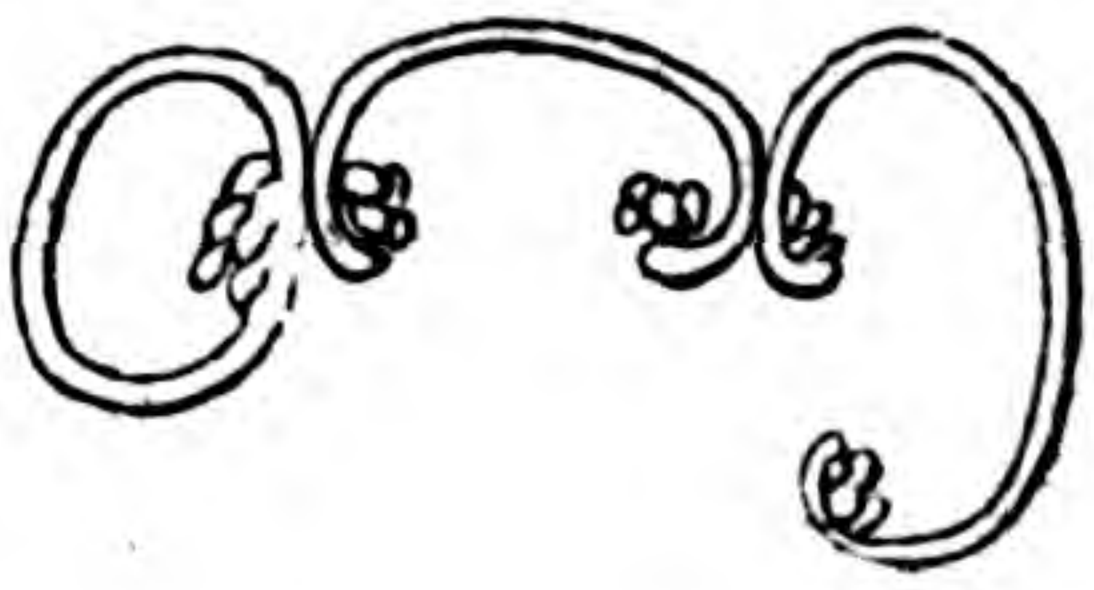

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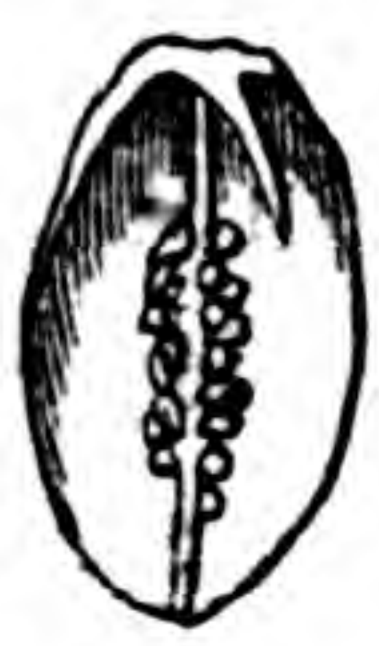

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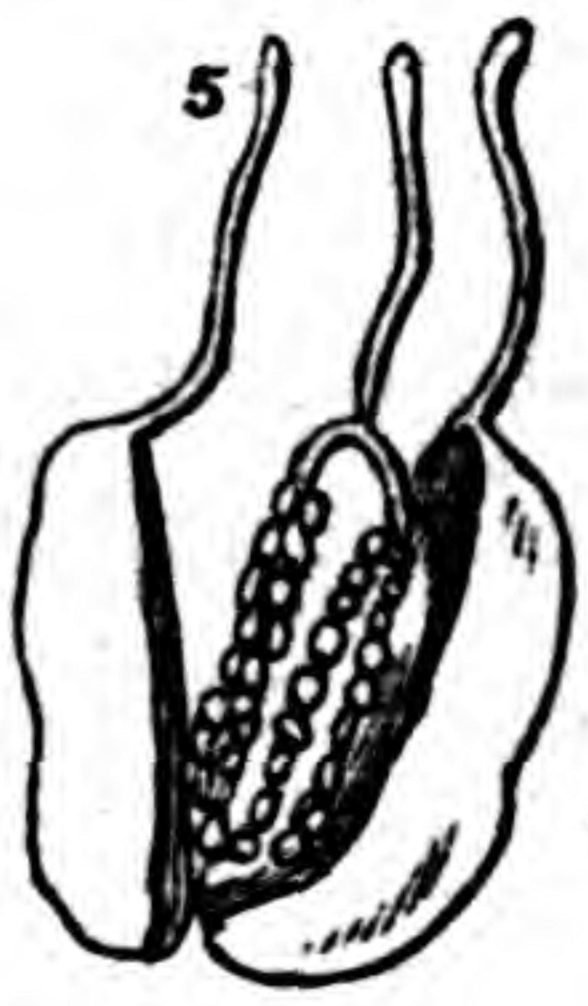

A not unfrequent condition was that in which there were two lateral carpels with no ovules on their edges (fig. 5), but between them there was an arched body, bearing a style, and studded with four rows of ovules, two on either side, as if the placentæ of both carpels had become detached, with a portion of the style from each, and had united to form the arch:—or, were there four carpels originally, the anterior and posterior reduced each to a narrow strip bearing ovules and united together above, so as to form a single style?

On a Species of *Pilobolus*.

By Frederick Currey, Esq., M.A., F.L.S. &c.

[Read Dec. 16th, 1856.]

A species of *Pilobolus* has lately occurred in the neighbourhood of Blackheath, differing in some respects from the only common species, *Pilobolus crystallinus*, and closely resembling, if it be not identical with, *Pilobolus roridus* of Bolton, which has hitherto been considered a doubtful form. Like *Pilobolus crystallinus* it is a most delicate and elegant fungus, although not choice in its habitat, flourishing as it does on the surface of cow-dung. My attention was first attracted by a number of little points of a dull yellow colour, giving a scabrous appearance to the surface of the dung, and an examination with a lens disclosed a very few small, ripe specimens of the *Pilobolus*, not differing much at first sight from ordinary specimens of *Pilobolus crystallinus*. By scraping off a thin layer of the cow-dung and keeping it under a small bell-glass in a moist atmosphere, an abundant crop appeared in a few hours, which was followed by others in continuous succession for a fortnight; after which the soil appeared to be exhausted, and in order to procure further specimens a fresh layer of the cow-dung was necessary. I have thus been enabled to follow out the different phases of the plant and to examine its structure with some minuteness. The yellow points above alluded to become elongated into filiform processes, tapering slightly towards the upper extremity, which frequently assumes a clearer and deeper colour (Pl. II. fig. 1). Subsequently the apex of these threads becomes gradually swollen into the form of a flattened sphere, at which period the plants look like small orange-coloured pins (fig. 2). The swollen heads gradually change colour, becoming first of a dull olive-green, and eventually black; or rather (as appears upon a closer examination) a very deep opaque purple. During the time that the heads are changing colour the upper part of the pedicel becomes swollen into the form of a clear ovoid vesicle, separated by a sharp constriction from the head, but passing gradually at its lower extremity into the line of the stem. This vesicle and the stem were usually continuous and crystalline, looking, in fact, as if made of the clearest glass; but in some instances a granular layer of protoplasm covered the walls of both, and in many specimens there was to be seen a bright orange-coloured band at the point of junction of the stem and vesicle, indicating either the existence of a septum, or a want of affinity between their fluid contents; I rather think the latter. From a time antecedent to the formation of the head, that is, from the period of growth shown in fig. 1, the beauty of these fungi was greatly increased by the vast number of drops of water with which they were always covered. This appearance of dew-drops is invariably seen to occur to some extent in *Pilobolus crystallinus*, but in the present species the drops were far more abundant, being sufficient in many instances entirely to conceal the outline of the stem; they occurred, although in less abundance, on the vesicle, and frequently also on the head, the latter however being often entirely free from them. Up to this point the description applies to the part of the fungus which is, so to speak, above ground; but the part which is imbedded beneath the surface of the dung is no less curious. There is no great difficulty in extracting this portion without injury with the point of a lancet, and then by a careful use of needles, plenty of water, and a delicate camel's-hair brush, the foreign matter may be cleared away, and it is then seen (figs. 3, 4) that the stem-cell becomes globular at its lower extremity, the globe being somewhat obliquely situated with regard to the axis of the stem, and being generally more or less filled with granular orange-coloured endochrome. The globe fits into a cup-shaped cell filled with a similar but denser endochrome, and this latter cell tapers gradually for a considerable length at its lower extremity, and ultimately expands into numerous colourless ramifications resembling the ordinary mycelium of any other fungus. The spores are formed beneath the black covering at the apex of the fungus, which covering seems to have been hitherto considered, at least in *Pilobolus crystallinus*, to be the coat of the sporangium. Such however is not the case in the present species, for this black covering may be drawn off like a finger-stall, leaving the ellipsoidal sporangial cell enclosed in its own proper thick gelatinous membrane still adherent to the apex of the pedicel, and filled with ripe spores. It is clear therefore that this purple skin only forms as it were a partial veil, and cannot be properly looked upon as a coat of the sporangium. Not unfrequently this skin either partially peels off, of its own accord, or is imperfectly developed, as shown in fig. 7; but it usually hides the sporangium entirely, and is finally cast off with it by the process peculiar to the genus *Pilobolus*, namely the elastic action of the septum which is formed at an early period across the upper end of the vesicle between that and the sporangium. This septum takes an upward growth, becomes gradually more and more everted, and at length by its pressure throws off the sporangium-cell and its purple veil to a distance of several inches. After this has taken place the upper end of the stem-cell exhibits the appearance shown in fig. 8. In the Transactions of the Breslau Academy for 1851 is to be found an elaborate account of *Pilobolus crystallinus* by Dr. Cohn, on reference to which it will be seen that the fungus just described differs from *Pilobolus crystallinus* in the great development in length of the stem, and the vast number of the drops of water spread over its surface. There is another peculiarity, which consists in a number of shining specks scattered over the surface of the veil, having the appearance of small grains of quartz; but these, although very general, are not universal. They are so minute that it is almost impossible to detach them separately, and they do not occur in sufficient numbers on any one plant to be capable of being scraped off in a mass. In one instance they seemed to dissolve in water into a number of exceedingly minute pear-shaped bodies; but the observation was an uncertain one, and beyond it I have not yet been able to ascertain their nature.

The distinctions above mentioned would not, I think, be alone sufficient to separate this species from *P. crystallinus*, and I should have been disposed to consider the present fungus as only a form of the latter species, had it not been for a difference in the spores. Such a difference, I need hardly say, is one of the safest criterions for the separation of species in Fungi, and one which will probably be more and more valued in proportion as the microscope is called in aid for the detection of such differences. Dr. Cohn describes the spores of *Pilobolus crystallinus* as globular, surrounded by a tough distinct membrane, the latter appearing as a broad dark line, and filled with flesh-coloured, grumous, highly refractive contents, with small nucleoli. Now the spores in my species (fig. 9) are quite unlike those figured by Dr. Cohn;

they are elliptical, of a pale straw-colour, and without any evident external membrane until treated with æther or alcohol, when by the contraction of the contents such membrane becomes visible, not however in the form of a broad dark band, but of a clear and bright line. The contents moreover are very slightly, if at all, granular.

In Bolton's account of *Pilobolus roridus* no particulars are given of the spores—indeed the microscopes of his time would hardly have enabled him to do so with accuracy; in other respects his account agrees sufficiently with the above description to lead me to think that his *Pilobolus roridus* is the same as that which I have described. There are two very curious facts connected with the above *Pilobolus*, which I have had an opportunity of investigating, and which are worthy of notice. They are alluded to by Dr. Cohn as having been noticed by former observers in *Pilobolus crystallinus*, but he refrains from giving any opinion, inasmuch as the appearances in question had not fallen under his own observation. The first is mentioned by Müller, the original discoverer of *Pilobolus crystallinus*, who states that he had seen in many of the vesicles a small white delicate worm, which crawled round and round, and appeared to swim as it were in a little ocean of its own. Müller thereupon came to the conclusion that *Pilobolus crystallinus* was neither animal nor vegetable, but a mixture of the two, in fact a Zoophyte—not in the modern acceptation of that term, but according to its proper meaning. Persoon, on the other hand, alleged that these creatures were nothing but *Anguillulæ*, which came out of the dung and crawled on the outside of the fungus. It would seem that Persoon's opinion is correct, for I have several times observed a species of *Anguillula* encased in the drops of water on the surface of my *Pilobolus*, and twirling round so actively that it is a matter of surprise that it does not cause the drops to collapse. There is no difficulty in extracting the worm from the drop, and it appears to be the common *Anguillula fluviatilis*, which no doubt climbs up the stem of the fungus and deposits itself in one of the numerous dew-drops. Similar worms may be seen crawling on the surface of the dung and unconnected with the fungus, leaving no doubt as to their place of origin. The sight of these animals revolving rapidly in their crystal cases is most curious and interesting. It is no matter of surprise that Müller should have been led to suppose that the worm was in the interior of the plant, for it not unfrequently happens that before the real vesicle is formed, a drop of water becomes attached to the apex of the stem precisely in the spot usually occupied by the vesicle, and it is not always easy for the observer to tell whether he is looking at the vesicle itself or at a substituted drop of water.

The second appearance alluded to above is not so easy of explanation. In the interior of the drops of water which, as has just been mentioned, sometimes occupy the place of the vesicle, I have several times seen a small orange-coloured body revolving with more or less rapidity, but having rather the appearance of being carried round and round by the force of a current than by any voluntary motion. This, or a similar appearance, was noticed by Ehrenberg, and described by him in a paper published in 1823, in Kruze and Schmidt's 'Mykologische Hefte'; he did not however ascertain what the revolving body was, and only endeavoured to explain its rotation by attributing it to some unknown physical agency which kept the drop of water in perpetual revolution. I was very desirous of ascertaining the nature of this moving body, and tried to detach it from the drop of water. This attempt was not successful, but I managed to float a drop entire with its orange-coloured occupant on to a piece of white paper, and then waited for the water to evaporate, hoping thus to leave the object high and dry. However, as the water dried up the body became entirely disintegrated, resolved itself into a mass of granular orange-coloured particles, and left nothing behind but a yellow stain on the surface of the paper. As to what its nature may be, or what may be the cause of its singular rotation, I can offer no conjecture, but I have thought it worth while to mention the above facts with the view of directing further attention to this curious phænomenon. It is interesting to notice the resemblance in point of structure between the genus *Pilobolus* and the fungus which causes the annual epidemic amongst the House Flies; the only essential difference being, that the latter throws off a single cell, whereas in *Pilobolus* the cell which is thrown off is the mother-cell of innumerable multitudes of spores, by which the species is reproduced. It is possible, however, that the contents of the single cell in the *Empusa* may become subdivided into smaller reproductive particles after separation from the parent plant; and this supposition seems the more probable as the single cell is of too large a size to admit of its gaining access to the bodies of the flies, in the interior of which (according to Dr. Cohn's account in a late paper) the first symptoms of this disease are always to be noticed.

There is one other fact which may be mentioned before I conclude, viz. the occasional appearance in the interior of the vesicle of small, pale yellow bodies, sometimes cylindrical, sometimes shaped like a dumb-bell (fig. 10). It is probable, I think, that these are young and imperfect spores which have escaped into the vesicle through a small rupture in the septum between that and the sporangium. When the septum is accidentally broken through, the whole mass of spores may be seen to rush into the vesicle, and the fracture, if very slight, might permit the escape of these small bodies, and at the same time not be sufficient to allow of the passage of the fully-formed spores.

Postscript.—I was not aware, until after this paper was finished, that the question of the specific difference between *Pilobolus crystallinus* and *Pilobolus roridus* has been lately discussed by Bail. His observations are to be found in the 'Botanische Zeitung,' 7th Sept. 1855.

DESCRIPTION OF PLATE II.

Fig. 1. The *Pilobolus* in an early stage, before the formation of the head, slightly magnified.

Fig. 2. The *Pilobolus* when it has assumed the pin-shape, slightly magnified.

Fig. 3. A perfect plant magnified about 20 diameters.

Fig. 4. The lower portion of a plant in which the swelling at the lower end of the stem-cell is less oblique than in figs. 3 & 5.

Fig. 5. A perfect plant magnified 44 diameters, showing the adherent dew-drops.

Fig. 6. The root-cell and a portion of the stem-cell of another plant, magnified 44 diameters.

Fig. 7. The upper portion of a plant magnified 60 diameters. This specimen shows the peeling off, or imperfect development, of the veil, and the band of orange-coloured matter at the junction of the stem and vesicle, referred to in the text.

Fig. 8. A portion of the vesicle of a plant which has cast its sporangium, showing the eversion of the septum.

Fig. 9. Spores magnified nearly 400 diameters. The one with a double outline has been treated with alcohol.

Fig. 10. Cylindrical and dumb-bell-shaped bodies occasionally seen in the interior of the vesicle.

A Note on *Spiranthes gemmipara*. By Professor LINDLEY, F.R.S., F.L.S. &c.

[Read January 20th, 1857.]

WITH the permission of the Society, I venture to draw its attention to a point in Irish botany which has not yet been sufficiently examined. In the year 1828 Sir James Smith published in his 'English Flora' (iv. 36) an account of a *Neottia gemmipara* which had been discovered in August 1810, near Cork, by Drummond, and at the same time communicated to him by the Rev. Mr. Hincks. Smith compared it to his *Neottia spiralis*, from which he distinguished it by the leaves being "lanceolate and as tall as the stalk. Spike 3-ranked, twisted. Bracteas smooth."

Subsequently a figure, taken from the dried specimen in Smith's Herbarium, was published in the 'Supplement to English Botany,' t. 2786; and was afterwards copied by the younger Reichenbach, in 1851, into his elaborate 'Orchideæ in Flora Germanica recensitæ.' So early, however, as September 1840, I had examined the specimen in the Smithian Herbarium, and referred it to the genus *Spiranthes* (Gen. et Sp. Orch. p. 464), with the remark that it so much resembled *Spiranthes Romanzoffiana*, a Unalaschka plant, that I could scarcely doubt the identity of the two. Nevertheless, Prof. Reichenbach, misled by the only published figure, expressed a doubt whether the plant even belonged to the genus *Spiranthes* (Orch. in Fl. Germ. p. 154). This acute Orchidologist was not aware that, so long before as 1844, it had been made the subject of a special memoir laid by Mr. Babington before this Society, and afterwards published in our Transactions (xix. p. 261. t. 32). Since that time it has, I believe, remained unnoticed by all writers on critical botany. A recent examination of the Neottian Orchids of the Old World, the result of which is now before the Society in another communication, has rendered it necessary to reconsider the relation which the Irish *Spiranthes* bears to other species, and the conclusion at which I have arrived forms the subject of the present note.

Of *Spiranthes gemmipara* I possess two authentic specimens, for which I am indebted to the kindness of Lord Berehaven, the present Earl of Bandon, on whose estate, near Castletown, the species occurs. Both were gathered at the end of August 1843. These correspond so nearly with the description given by Mr. Babington, that a redescription would be superfluous. The only circumstances to which it seems useful to advert are—1, that the adhesion of the sepals and petals is no greater than occurs in *S. autumnalis*; 2, that the sepaline hairs represented in Mr. Sowerby's figure are scarcely discoverable in the dried specimen; 3, that the face of the column is distinctly pilose below the stigma, as Mr. Sowerby has shown it; 4, that the lip has two distinct, rather large, oblong calli *within* the base, which were overlooked by both Mr. Babington and Mr. Sowerby. Other material points are, that the foot of the column is unusually long, whence the breadth of the base of the sepals and apex of the ovary is much greater than usual, that the base of the lip is nearly twice as broad as the apex above the contraction, and that the coherent sepals and petals curve their points upwards in such a manner as to become secund, while the point of the lip projects beyond them in front.

The first suggestion that is on record as to the relation of this plant is that of Smith, who compares it with *Sp. autumnalis* (his *Neottia spiralis*), from which he separates it. The second is my own, that it may be identical with *Sp. Romanzoffiana*. The third is that of Mr. Babington, who refers it unhesitatingly to the *Sp. cernua* of the United States, an old and well-known species.

Mr. Babington objects to its union with *Sp. Romanzoffiana*, because it differs by "its much shorter bracts, its blunt linear and equally broad sepals, and its longer spatulate lip." But if Reichenbach's figures are examined (and he evidently possessed excellent materials), especially the left-hand figure of his t. 125, and all the analysis, it will be seen that these distinctions are unreal, with the exception of the short bracts. Better differences are to be found in the hairy sepals of *Sp. Romanzoffiana*, and if I mistake not, in the smaller calli placed far within the base of the lip of that species.

From the proposal to identify the plant with *Spiranthes cernua*, I am obliged wholly to dissent. The dispersion of terrestrial Orchids is doubtless far greater than is generally supposed, and, therefore, mere geographical probabilities cannot have much weight; at the same time we must require very strong proof that a plant hitherto unknown, except in the south-east of Ireland, is the same as a common North American species. Not only does it seem to me that such proof is absent, but I hope to show that the evidence lies all the other way. *Sp. cernua* has long naked stems and a thin spike loaded with glandular hairs—*Sp. gemmipara* has short leafy stems and a dense naked spike. *Sp. cernua* has the ovary very narrow and much contracted below the sepals, as is usual in the genus—in *Sp. gemmipara* it is pear-shaped, and there is scarcely a trace of a contraction, as Mr. Sowerby has very well shown in his figure. In *Sp. cernua* the sepals and petals have very little cohesion, are long and narrow, and the lateral sepals are almost acute—in *Sp. gemmipara*, on the contrary, their cohesion is great, while the sepals are almost ovate and remarkably blunt. Moreover, while in *Sp. cernua* the lip is not much broader at the base than apex, has the basal calli on the very edge, and is covered externally with coarse hairs,—*Sp. gemmipara* has the lip nearly, if not quite, twice as broad at the base as apex, has the calli distinctly intramarginal, and has no hairs externally, as far as I can discover; Mr. Babington, indeed, describes it as glandular externally, a circumstance that escaped the observation of Mr. Sowerby, and which might easily be overlooked by others, the only glands I can make out being minute points just visible under a half-inch simple lens.

I therefore think the identification of *Sp. gemmipara* with *Sp. cernua* is to be regarded as a mistake, and that the former must be admitted as a perfectly distinct species, peculiar, as far as is at present known, to a small district in Ireland. In my view of the affinities of the species, it is much nearer *Sp. æstivalis* than *cernua*, although distinct from the former by its dense 3-rowed spike, leafy stem scarcely longer than the radical leaves, short pyriform ovary, and very broad base to the lip.

Contributions to the Orchidology of India.—No. 1.

By Professor LINDLEY, F.R.S., F.L.S. &c.

[Read January 20th, 1857.]

THE materials out of which the following observations proceed are principally derived from the highly important collections formed by Drs. J. D. Hooker and Thomas Thomson, who, with rare liberality, have placed everything they possess, bearing on the present subject, at my disposal. But in addition to such resources, many others must be mentioned, especially the Burma and Khasia and Malacca plants sent me by the lamented Griffith, the Indian collections in the Herbarium of the Museum of Natural History, Paris, a fine set dried by Mr. Thomas Lobb while in the service of our great nurserymen the Messrs. Veitch, many Ceylon plants from Mr. Thwaites, the late Col. Champion and others, Cuming's

Philippine Collection, Chinese plants from Fortune, Champion, and Vachell, authentic specimens from Wight and Achille Richard, and a pretty extensive series of Malay plants placed in my hands by my friends Prof. De Vriese and the late venerable Prof. Reinwardt. To these should be added whatever the herbarium contains of Dr. Stock's, whose loss we have so lately had to deplore, the whole of Wallich's materials, and everything that the great Hookerian Museum, or the Gardens of England have been able to supply. In short, there is little that has not been entrusted to me except the Malay plants of Horsfield in this country and those of Blume from Java and other Dutch islands.

To deal with so large a mass of materials in a single communication would fatigue the Society, even if it did not render any communication whatever altogether uncertain. I therefore propose to take up different portions of the subject as time will permit.

To nothing, perhaps, more remarkable does an examination of Indian Orchids lead, than to the unexpected fact that they show certain species to have a most extensive geographical distribution. Hitherto it has been believed that these plants are extremely local, and such is probably the case with epiphytes, but it is quite the reverse with terrestrial species, the range of some of which proves to be as wide as that of the most ubiquitous species belonging to other natural orders.

It has been long known that our *Orchis latifolia* wanders into North-Western India, where it was found by Buchanan Hamilton, Wallich, and Royle; to this must now be added Western Thibet, whence Dr. Thomson has brought it (Hb. 254). But this is no solitary case.

Herminium Monorchis, in no respect whatever distinguishable from its English state, is found in North-Western India, and probably also in Sylhet; while the *Herminium unalaschkense** of Chamisso, from the distant Aleutian Islands, is identical with the *Herm. congestum* found on the Alps of Sikkim.

Gymnadenia cucullata, a plant of Eastern Europe and Siberia, seems to be the same as a plant gathered by Dr. Hooker, in Sikkim, at the elevation of 14,000 feet.

Goodyera repens is common in Sikkim at the height of 11,000–12,000 feet; while *Goodyera procera* extends from Sikkim to Hong Kong, by way of the Nilgherries, Ceylon, and Java.

In like manner *Zeuxine sulcata* is as much an inhabitant of

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* This is by no means *Platanthera Schiffmareffiana*, as Prof. Reichenbach supposes.

Hong Kong, the Philippines, and Ceylon, as it is of Indian plains as far as Peshawur.

What I believe to be *Spiranthes autumnalis* occurs in North-Western India, and *Sp. australis* seems to grow everywhere from Siberia, Peshawur, and North-Western India generally, the Sunderbunds, Nilgherries, Ceylon, and Java, to China, New Holland, and New Zealand. What is more, I think that any one who has examined a long suite of specimens will probably be right in regarding this variable plant as nothing more than our own *Sp. æstivalis.*

Similar facts are elicited by a critical examination of the genera *Epipactis* and *Cephalanthera. E. veratrifolia,* a remarkable Persian species, was found at Peshawur by Major Vicary; and there can be no doubt that the common Indian species described under the names of *consimilis, macrostachya, herbacea* and *Dalhousiæ,* are only so many states of the well-known European *E. latifolia.* It is equally certain that my *Cephalanthera acuminata,* found all over Northern India from Mussooree to Bootan, is identical with the European *Cephalanthera ensifolia.*

Epipogium Gmelini was found in Sirmur by Dr. Thomson.

Lastly, what is most startling and unexpected, is the discovery by Dr. Hooker, in Sikkim, of a species of the genus *Tipularia,* hitherto known only in the United States of America. This plant, although different in some respects from the American form, and distinguished by Prof. Reichenbach, Jun., is probably nothing more than a form of the original *Tipularia* itself, which thus appears at once in two points of the globe distant some 12,000 miles from each other.

Facts of this nature are of the more interest, seeing that the ordinary modes of dispersion by birds, by winds, by waves, by man, would seem to be inoperative, or at least insufficient to explain such very remarkable ranges.

In the following enumeration of species, I have not thought it necessary to observe much order, the purpose of a catalogue being equally well served whatever the sequence of the species.

I. PHOLIDOTA, *Lindl. Gen. et Sp. Orch.* p. 36.

1. P. imbricata, ***Lindl. l. c.***

Sikkim Himalaya, at 3000–5000 feet; Khasia Mountains, at 2000–4000 feet, *J. D. H. & T. T.* (78)

2. P. rubra, ***Lindl. l. c.***

Sikkim Himalaya, at 6000 feet, *J. D. H.*; Khasia Mountains, at 4000 feet, *J. D. H. & T. T.* (123)

3. P. recurva, *Lindl. l. c.*
Sikkim Himalaya, at 5000 feet, *J. D. H.* (158)

Flowers dirty rose-colour.

4. P. articulata, *Lindl. l c.*
Khasia Mountains, at 2000–6000 feet, *J. D. H.* (79), *Lobb.*

"Scarcely odorous. Lowest flowers on spike open first."—*J. D. H.*

5. P. CALCEATA (*Rchb. fil. in Bonpl. Oct.* 15, 1856); pseudobulbis e latâ basi angustissimis cæspitosis monophyllis, foliis lanceolatis in petiolum longum angustatis, spicis erectis capillaribus foliis longioribus, bracteis dissitis ovatis subpersistentibus, sepalis oblongis obtusis ecarinatis, labello apice bilobo lobis incurvis.
Khasia Mountains, *J. D. H. & T. T.* (122)

A small-flowered plant with convex, very blunt, wholly keelless sepals.

II. OTOCHILUS, *Lindl. Gen. et Sp. Orch.* p. 35.

6. O. alba, *Lindl. l. c.*
Sikkim Himalaya, at 5000 feet, *J. D. H.*; Khasia Mountains, at 4000–6000 feet, *J. D. H. & T. T.* (81)

7. O. fusca, *Lindl. l. c.*; *Wallich, Pl. As. Rar.* i. t. 68; *Bot. Mag.* t. 3921.
Otochilus, *Griff. Ic.* t. 289.—O. latifolius, *Notulæ*, p. 279; *It. Not.* p. 75.
Sikkim Himalaya, at 2000–6000 feet, *J. D. H. & T. T.*; Khasia Mountains (82), *Griffith*; Bootan, *id.*

This is readily known from the last by its nearly persistent bracts and much narrower leaves.

8. O. porrecta, *Lindl. l. c.*
Tetrapeltis fragrans, *Wall. in Lindl. Gen. et Sp.* p. 212.
Otochilus, *Griffith, Ic.* t. 288; *Itin. Notes*, p. 75.—O. lancifolius, *Notulæ*, p. 278.
Dipodous genus, *Griff. Ic.* t. 329; *Not.* p. 406.
Khasia Mountains, *J. D. H. & T. T.*, *Lobb*, *Griffith*; Dilling in the Mishmee Mountains, and towards the summit of Thumathaya, *Griffith.*

I give Griffith's names as I find them in his published works; but it is hardly to be doubted that his editor has transposed them. This species must have been what he meant to call *O. latifolius.* It is also unquestionably the "dipodous genus," not *Dipodium* from Dilling.

The name *Tetrapeltis* originated with Wallich, who gave it to a remarkable plant of uncertain origin, of which it was supposed that a drawing only existed among his collections. It was said by him to have a stigmatic gland common to a pair of narrow caudicles, which bore four peltate hemispherical pollen-masses, whence the name. I had however described it three years before as a probable species of *Otochilus*, the pollen-masses of which had not been found. And such it really is, as Griffith determined, without however knowing that it was a described plant. The stigmatic gland described by Wallich, but not represented in his drawing, has no existence, as Griffith's figure and description show, and as I have verified. The species is, however, remarkable for having two straps holding together the pollen-masses in pairs, each strap having a perfectly well-defined outline; of these only rudiments occur in the two other species. They are analogous to the narrower and more obscure threads which occur in *Pholidota articulata*, as I learn from Dr. Hooker's drawings.

III. TIPULARIA, *Nutt. Gen. Amer.* ii. 195.

9. T. JOSEPHI (*Rchb. f. ined.*); labello acuminato.
Sikkim, 10,000–12,000 feet, *J. D. H.* (351)

When Prof. Reichenbach saw this in my herbarium he gave it the above name, distinguishing it by its "having the lateral lobes of the lip half ovate not acute, and by its shorter column." The latter difference seems constant, the former cannot be relied on. I, however, find that the lip of the Indian species is acuminate, and the flowers smaller and darker coloured. The two plants are, however, so much alike that I cannot avoid doubting their specific distinctness.

IV. EPIPACTIS, *Camerarius.*

10. E. veratrifolia, *Boissier*, *Diagnoses*, xiii. 11.—(E. consimilis, *Wall. Cat.* 7403, nec *D. Don.*)
Peshawur, Major Vicary, *J. D. H.* (324)

Identical with the plant found by Kotschy in the gorges of Mount Elbruz, near Derbend. The plant intended by Don for *E. consimilis* is *E. latifolia.*

11. E. Royleana, *Lindl. in Royle's Illustr.* 368.
Ravine above Jungnam, Kunawur, *T. Thomson*; a single specimen.

The bracts are short and broad, and the parts of the flower less elongated than in *E. americana*, which is very like this.

12. E. latifolia, *Swartz*, *Act. Holm.* 1800, p. 232.—(E. consimilis, *Don*, *Prodr.* p. 28.—E. macrostachya, *Lindl. in Wall. Cat.* 7404.—E. herbacea, *Lindl. in Royle's Illustr.* 368.—E. Dalhousiæ, *Wight*, *Ic.* t. 1723.)
N.W. Himalaya, 6000–9000 feet, *T. T.* (323); W. Thibet, 7000–11,000 feet, *T. T.* (322); Sikkim, 11,000 feet (323).

The Himalayan plant is more robust in growth than the European specimens, but is evidently the same. The plant found by Dr. Thomson in Western Thibet has a thinner raceme, and a smaller lip much compressed with a pair of large calli at the base of the epichil; the ovary, moreover, is perfectly smooth, as in what has been called *Epipactis Phyllanthus*, but I do not think, in so variable a species, such characters have any distinctive value. *E. herbacea* is not distinct from the *E. viridiflora* of European botanists.

13. E. INTRUSA; habitu *E. latifoliæ* valdè attenuatæ folio unico parvo cuique cauli, floribusque longè distantibus, hypochilio subtus intruso, epichilio ovato apiculato trinervi ecalloso.

Sikkim, at 11,000 feet, *J. D. H.* (323 mixed with *E. latifolia*).

This seems to be something more than an attenuated starved state of *E. latifolia,* (with which it is mixed in Dr. Hooker's collections,) on account of the hypochil being pushed upwards as it were from below, so as to be convex in the inside, and the epichil having no calli and no venules, but only three well-defined veins ending in a little distinct point.

V. CEPHALANTHERA, *L. C. Richard.*

14. C. ensifolia, *L. C. Richard.*

C. acuminata, *Lindl. Gen. et Sp. Orch.* p. 412; *Wight, Ic.* t. 1721.

Secunda Devee, near Mussooree; Dadoo-ka-Taola, in Gurhwal; N.W. Himalayas generally to the height of 5000–10,000 feet, *J. D. H. & T. T.* (321); Bootan, near Panga, in oak and fir woods at 7500 feet, *Griffith*; in pine and oak woods under the mountain Vari-Ki-teibi, *Jacquemont* (651).

I am persuaded that the Indian Cephalantheras all belong to one and the same species, that one being the common European *C. ensifolia.* The specimens before me differ in the length and breadth of their leaves and in the denseness of their inflorescence; perhaps, too, in the form of the epichilium, a point hard to determine when dried. The Bootan specimen is the smallest. It has already been found in the country beyond Caucasus according to Reichenbach fil. I have seen no specimen with the long leafy bracts which Dr. Wight's artist has represented; such a state is only to be found occasionally associated with the lowest flower.

VI. LISTERA, *R. Brown.*

15. L. PINETORUM; foliis cordato-subrotundis acutis, rachi flexuosâ tomentosâ, bracteis adpressis ovarii longitudine, floribus subsessilibus, labello maximo obovato bilobo, columnâ elongatâ.

Sikkim, 10,000–11,000 feet, near Lachen in pine woods, *J. D. H.* (355)

Flowers pale green, the largest in the genus. Most like *L. con-*

vallarioides, from which it differs in the form of the leaves, the sessile flowers, &c. *L. Escholtziana*, of which *L. Banksiana* is a synonym, differs in its smaller long-stalked flowers and in the form of its leaves.

16. L. TENUIS; foliis ovatis acutis, caule capillari, bracteis parvis pedicellis æqualibus, labello cuneato emarginato sepalis multò longiore.

Sikkim, 11,000–12,000 feet, *J. D. H.* (354)

A very slender plant. Lip apparently deep olive colour.

17. L. MICRANTHA; foliis subrotundo-ovatis radicalibus, racemo tenui, bracteis pedicellis filiformibus multò brevioribus, labello ovato cucullato trilobo sepalis vix æquali, lobis lateralibus rotundatis intermedio acutissimo.

Sikkim, 10,000 feet, *J. D. H.* (353)

A very remarkable plant, with the lip concave, not convex, and scarcely so long as the sepals; at its base it is furnished with a pair of auricles, while the sides of the acute middle lobe have each a single minute sharp tooth.

VII. NEOTTIA, *Linn.*

18. N. listeroides, *Lindl. in Royle's Himal.* p. 368.

N.W. Himalaya, at 8000 feet, *T. Thomson* (356).

The specimens, like those brought home by Dr. Royle, appear in two states, the one very much stouter than the other.

VIII. EPIPOGIUM, *R. Br.* (Galera, *Blume, Bijdr.* i. 415. t. 3. Podanthera, *R. Wight, Ic.* t. 1759. Ceratopsis, *Lindl. Gen. et Sp. Orch.* p. 383.)

There is no doubt that all these genera are the same, and that their supposed differences have been suggested by inexact observation, or insufficient comparison. *Ceratopsis*, founded on the *Limodorum roseum* of D. Don, was supposed by me to have cirrhi on the column, such cirrhi being nothing more than the cartilaginous caudicles of its pollen-masses observed in an old and withered flower. *Podanthera* and *Galera* are not different from each other even as species, and are merely *Epipogiums* with an undivided lip bearing two hairy lines along the middle. The following are the only species yet known.

19. E. GMELINI, *L. C. Richard*; *Rchb. f. Orch. Germ.* t. 116; *Hooker, Bot. Mag.* t. 4821; labello auriculato ovato intùs pulverulento seriatim papilloso, calcare inflato.

Sirmur, N.W. Himalaya, at 8000 feet, *T. Thomson* (224). Two specimens only seen.

Although this differs in some small particulars from the European and Siberian plant, I cannot think the two specimens found by Dr. Thomson to be anything more than a slight variety. Their general aspect is quite the same as usual, but the lip is more acute, and its auricles are much smaller, or even obsolete. It would seem, however, from the stains still observable in the dried specimens, that the characteristic blotches on the lip of the European state are also present, and the magnitude of the auricles of the latter, like the length of the sepals and petals, is inconstant.

20. E. ROSEUM (Ceratopsis rosea, *Lindl. Gen. et Sp. Orch.* p. 383); labello indiviso acuto intra apicem pulvinato-glanduloso lineis 2 pubescentibus decurrentibus continuis, calcare clavato integro.

Upper Nepal, *Wallich*, according to *D. Don*.

No specimens of this exist among any of the modern collections that I have examined. That in my herbarium was sent by Wallich to Rudge among the first of his Indian consignments. The flowers are much smaller than in *E. nutans*, there is a large papillose convexity just within the apex of the lip, and the spur is quite unlike that of either of the two other species.

21. E. NUTANS (Galera nutans, *Blume, l. c.* Podanthera pallida, *Wight, l. c.*); labello indiviso acuto apice plano lineis 2 pubescentibus decurrentibus continuis, calcare oblongo emarginato.

Ceylon, *Thwaites, Macrae*; Sikkim, in hot valleys, *J. D. H.* (348), *Cathcart*; Wynaud, *Wight*; Java, *Blume*.

There is no apparent difference among the specimens from these places, all of which I have examined except that from Java. Dr. Wight's artist has indeed represented three hairy lines upon the lip of *Podanthera pallida*, but this is certainly an oversight, as I have ascertained not only from excellent drawings by Dr. Hooker and Mr. Thwaites, but from Wight's own specimens. There seems to be some difference in the colour of the plant, for Dr. Hooker's figure represents it of a uniform pale straw colour, while Cathcart and Macrae's draughtsmen have it whitish, with small red speckles.

IX. SPIRANTHES, *Richard*.

22. S. autumnalis, *Rich. Orch. Europ. Annot.* 37.

Sohonghat, May 1845, *T. Thomson*.

A couple of specimens gathered at this place are, I think, unquestionably our European species.

23. S. australis, *Lindl. in B. Reg.* 823. (Sp. australis et densa, *Wight, Ic.* t. 1724.—Spiranthes, *Griffith, Notul.* iii. 384. t. 348.—Sp. N. Zelandiæ, *Hooker, Fl. N. Zealand,* i. 243.)

Upper Assam, *Griffith*; Sunderbunds, *id.*; Bootan, *id.*; Nilgherries, *Perrottet* (864); Western India, *Jacquemont* (411); Peshawur, *Major Vicary*; Java, *Reinwardt*; Hong Kong, *Champion*; China, Sowchow, *Fortune*; Chusan hills, *id.*; Canara, *Dalzell* in hb. Stocks; N.W. Himalaya, 6000–9000 feet, *T. Thomson* (326); Khasia, 4000–6000 feet, *id.*, *Lobb*, *Griffith*; Sikkim, 6000–10,000 feet, *J. D. H.* (327).

In the long list of localities here given, there occur all the forms of the species previously described (*Gen. et Sp. Orch.* 465) and others, but they run into each other in so many directions, that any attempt further to define the forms would be unsuccessful. The most distinct of all is the Chinese plant, which I formerly called *pudica*, and which seems to have invariably a smooth rachis and ovary, while all the others are more or less downy. Fortune's Sowchow plant is said to have yellow flowers, which I take to be a mistake, there being nothing whatever in its structure to separate it from the red-flowered *S. pudica*. One of the Java plants in Reinwardt's herbarium has the red flowers, in another they are white, and it appears that in this respect, as well as in the size of the flowers, the specimens vary from hill to hill. Griffith seems, however, only to have seen the white sort.

24. S. STYLITES; foliis gramineis vix in caulem ascendentibus, caule elato glabro 4-vaginato, spicâ laxâ quaquaversâ ovariisque tomentosis, floribus glabris angustis elongatis, sepalorum marginibus rectiusculis, petalis linearibus univeniis, labello oblongo canaliculato apice crispulo pubescente basi calloso-sagittato, columnâ valde elongatâ rostello subulato.

China, province of Che-Kiang, *Fortune.*

At first I took this for the N. American *Sp. cernua*, some of the states of which it much resembles, and with which it corresponds in the sagittate lip; but its flowers are narrower in proportion to the breadth, and its column is so long that the attenuated point of the rostellum reaches beyond the middle of the lip.

X. HERPYSMA, *Lindl. Gen. et Sp. Orch.* p. 506.

25. H. longicaulis, *Lindl. l. c.*

E. Nepal, at 3000 feet, *J. D. H.* (340).

Flowers white, tinged with pink (*Cathcart*). The lip is sometimes rounded and nearly equally 3-lobed; sometimes it is oblate with a very small middle lobe.

XI. ANÆCTOCHILUS, *Blume, Fl. Jav.* præf. vi.

26. A. ELATUS; foliis radicalibus 3–4 subrotundo-ovatis apiculatis subtus purpurascentibus venis concoloribus, scapo gracili erecto pubescente vaginis tribus acuminatis patentibus, spicâ distantiflorâ, labelli medio auriculati fimbriis laminâ bipartitâ integrâ longioribus, sacco conico acuto.

Ootacamund, in damp woods near Wallaghaut; *M'Ivor*, 59.

This seems to be quite distinct from *A. setaceus* in its long slender stem, loose inflorescence, very long fringes to the lip, which is distinctly auriculate near the middle, and in the want of coloured veins on the leaves.

27. A. lanceolatus, *Lindl. Gen. et Sp. Orch.* p. 499.

Khasia Hills, at 4000–5000 feet, *J. D. H. & T. T.* (330); Sikkim, 5000 feet, *J. D. H.* (338); Mishmee Hills, lower ranges, *Griffith.*

The specimens from Khasia have the fringes on the lip much shorter than in those from Sikkim and Assam, but I see nothing else by which to separate them. The sac of the lip is very short and almost hemispherical; the leaves are nearly as long as the flower stem, and rather unequal-sided. Lip white with brown fringes.

28. A. LUTEUS; caule folioso, foliis ovatis acutis undulatis scapo 1–2-squamato longioribus, spicâ conicâ, labelli fimbriis setaceis laminæ lobis oblique truncatis multo brevioribus, sacco hemispherico.

Sikkim, 5000 feet (341 in part), *J. D. H.*, *Cathcart.*

Upper sepal and petals rufous, lower herbaceous; lip bright yellow with a crimson line along the centre. Anther crimson. Two conical yellow processes in front of the yellow column. Inodorous. The true structure of this very distinct species is shown in Dr. Hooker's drawings.

29. A. GRANDIFLORUS; caule folioso, foliis oblongis acutis unicoloribus scapo longioribus, floribus glabris, sepalis variegatis, labelli fimbriis acuminatis basi latis laminæ lobis ovatis brevioribus, sacco obtuso.

Sikkim, 4000–6000 feet, *J. D. H.* (329); Khasia, 4000 feet, *id.*

A much larger plant than any other, with flowers in long loose spikes. Sepals spreading, green with rose-coloured veins; lip white, with a tinge of pink; anther crimson; column yellow, with a pair of conical processes in front. Inodorous.

30. A. setaceus, *Blume, Bijdr.* t. 15; *Bot. Reg.* t. 2010. (Orchis picta, *Herb. Reinwardt.*)

Java, *Reinwardt.*

31. A. brevilabris, *Lindl. l. c.*

Sikkim, *Cathcart.*

No specimen of this exists in the herbarium, but there is a drawing in Mr. Cathcart's portfolio. The lip is white, with dirty purple notches in the room of fringes, the number of which is much greater than in the Assam plant, from which the species was first described. The leaves have yellow veins, and much resemble those of *Anæctochilus setaceus*. The short lip, with its two broad obovate lobes, are very characteristic. The lateral sepals spread at right angles, and are rosy at the point but green at the bases.

32. A. (Myrmechis) CRISPUS; foliis subrotundo-ovatis acutis crispulis concoloribus scapo brevioribus, spicâ pubente laxâ 5-florâ, labelli mutici lobis terminalibus semiovatis acutis serrulatis, sacco hemisphærico.
Sikkim, *Cathcart*.

Of this no specimens exist in the herbarium. Mr. Cathcart's artist represents it as a plant 6 or 7 inches high, with roundish 3-ribbed leaves setting close to the stem, and shorter than the downy scape, which has two distant acuminate scales. The flowers (five) are distant, white, with no fringes on the unguis of the labellum, whose terminal lobes are half-ovate, somewhat falcate, and serrulate on the outer side. It is so very different from all others that I do not hesitate to describe it from a drawing only.

XII. PHYSURUS, *Rich.* *Lindl. Gen. et Sp. Orch.* 501.

No species of this genus occurs among Dr. Hooker's collections. The following are new:—

33. P. hirsutus (Goodyera hirsuta, *Griffith*, *Ic.* t. 347; *Notul.* iii. p. 393).
On the Burmese frontier of Assam, *Griffith*.

I have seen no specimens. The leaves are said to be glaucous beneath; the scape or rather the spike tawny; the bracts and all the flowers more or less ferruginous, with a white lamina to the lip.

34. P. VIRIDIFLORUS (Neottia viridiflora, *Blume*, *Bijdr.* 408); caule debili ascendente usque ad spicam folioso, foliis ovalibus acutis inæquilateris, spicâ 6–8-florâ, sepalis crassissimè carinatis, labello lanceolato apice deflexo, appendicibus calcaris filiformibus capitatis.
Java, *Lobb & De Vriese*.

Four specimens occur in Sir W. Hooker's herbarium. It is a weak plant, not unlike *Physurus debilis*; the closed flowers and excessively thick keels of the sepals are remarkable. Petals with the inner edge straight, the outer straight near the point, half-oblong next the base.

35. P. GLANDULOSUS; foliis rosulatis ovato-oblongis membranaceis scapo erecto filiformi tomentoso supra medium vaginato multò brevioribus, spicâ pauciflorâ corymbosâ pilis glandulosis conspicuis tectâ, labello lineari cana-

liculato apice parvo cochleari basi hemisphærico ventricoso juxta columnam subitò in calcar conicum extenso.
Borneo, *Lobb.*

Flowers small, inconspicuous, furnished with hairs having broad depressed glands.

36. P. Blumei, *Lindl. l. c.* p. 504.
Ceylon, *Thwaites* (598).

Flowers pale brownish red, with the blade of the lip white.

XIII. RHOMBODA.

Ovarium rectum. *Sepalum dorsale* petalis agglutinatum, anticum; *lateralia* basi valdè gibba. *Labellum* cucullatum, basi ventricosum, 3-lobum, appendicibus 2 rhombeis intra scrotum juxta basin. *Columna* brevis, altè cucullata, resupinata, rostello obtuso, antice lineis 2 parallelis carnosis elevatis apice expansis truncatis aucta.

37. R. longifolia.
Sikkim, unique, *J. D. H.* (335).

A great caulescent plant. Leaves 6–8 inches long, standing twice as high as the scape, which has a pair of close-pressed sheaths. Spike 6 inches long, very slightly downy. Bracts acuminate, shorter than the rostrate ovary. Flowers apparently dull brownish red, smooth. Sepals subulate at the points; petals unequally falcate, firmly glued to the upper sepal. The column resembles a resupinate membranous goblet, within which lies the acuminate anther. In front of the column grows a pair of contiguous fleshy ridges which suddenly project into a strong ledge at the base of the stigma.

This genus most nearly resembles *Rhamphidia*, from which however the very peculiar apparatus in front of the column and the internal appendages of the lip distinguish it. The latter are lozenge-shaped, flat, petaloid, and terminate two deep red simple veins originating at the base of the column. They are extremely like what occur in *Dossinia lanceolata.*

XIV. RHAMPHIDIA, *Lindl. Gen. et Sp. Orch.* p. 494. Goodyeræ §.

38. R. ovalifolia. (Goodyera ovalifolia, *Wight, Ic.* 1730.)
Sikkim, at 3000 feet, *J. D. H.* (337).

Near *R.* (*Goodyera*) *elongata,* from which it is distinguished by its lip, 3-lobed at the point, and its truly ovate oblong leaves. Wight's figure is much exaggerated and inconsistent with itself.

39. R. rubens. (Cerochilus rubens, *Gard. Chron.*, *New Plants*, no. 45. Goodyera 4, *Griff. Not.* iii. p. 390.)
Naga Hills, Khasia; *Griffith.*

When I published this under the name of *Cerochilus rubens*, I had forgotten my old section of *Goodyera*, which I had not seen for fifteen years. It seems to me to be undoubtedly Griffith's 4th *Goodyera*, which I have from himself, although the flowers are larger, as was to be expected in a cultivated plant.

40. R. **TENUIS**; caule scapoque pubescentibus, scapi vaginis supremis aristatis, spicâ longâ tenui tomentosâ, labello libero obtuso margine subrepando extùs piloso.
Philippines, *Cuming.*

Very like *R. elongata*, but the spike much more slender, the flowers not more than half the size, the lip quite free, sparingly covered with jointed hairs externally, and the calli of the lip simple and incurved, not broken up into narrow membranes.

41. R. **ALSINEFOLIA** (Neottia alsinefolia, *Herb. Reinwardt*); debilis, caule multifolio, foliis ovatis, spicâ 2–3-florâ, bracteis membranaceis fimbriatis ovario brevioribus, petalis sepalo antico solutis acùminatis obtusis recurvis, labello apice transverso angusto bilobo.
Java, *Lobb* in Hb. Hooker, *Reinwardt.*

Stem weak, many-leaved at the very point, 2–3-flowered. Flowers small, white, with odd sepal in front. Petals quite free, bluntly acuminate, recurved at the point. Lip ventricose, acuminate, ending in a narrow transverse almost reniform point. The separation of the petals and third sepal, in this species, is very remarkable.

42. R. **GRANDIFLORA**; caule densè folioso, foliis ovato-subrotundis acutis, spicâ 2–3-florâ sessili glabrâ, sepalis petalisque obtusis acuminatis, labello libero apice 2-dentato.
Java, *Lobb* (192).

Apparently a trailing plant with stems 6 or 7 inches long, closely covered with roundish ovate acute leaves. The flowers are twice as large as in any other species and perfectly glabrous. The lip is channelled and acuminate from a free ventricose base, with two short tooth-like blunt lobes at the point.

XV. GOODYERA, *R. Brown.*

43. G. secundiflora, *Griffith, Not.* iii. 393; *Ic.* t. 347; also Goodyera no. 6, *id. Not.* iii. 392.
Khasia, 4000–6000 feet, *J. D. H. & T. T.* (342, 328). Woods in the province of Che-Kiang, *Fortune*; Surureem, in Assam, *Griffith.*

Flowers white, with a green dorsal sepal. Leaves green with pale variegations. Usually from 4 to 10 inches high; but there is a specimen in the collection (328) nearly 18 inches high with larger flowers. The Chinese plant has also rather larger flowers, but is not taller than the common state.

44. G. HISPIDA; foliis rosulatis subsessilibus ovato-lanceolatis acutissimis scapo 4-vaginato longioribus, spicâ spirali, alabastris subglobosis pilis articulatis hispidis, sepalis apice crassis recurvis, labello cymbiformi acuminato canaliculato obtuso.

Khasia, 4000 feet, *J. D. H.* (2110).

A solitary specimen exists in the collection. Much resembles *G. repens*, but the leaves are very much larger. Flowers "white," remarkably hispid with glandular articulated hairs.

45. G. repens, *R. Brown, l. c.*

Sikkim, 11,000–12,000 feet, *J. D. H.* (349).

The specimens of this are taller and with larger flowers than some of those of Europe and N. America; the point of the lip is also a little more drawn out; but I find nothing distinct.

46. G. marginata, *l. c.*

N.W. Himalaya, at 8000 feet, *T. T.* (346.)

This little species, like the following, is one of those which have the sac of the lip destitute of hairs.

47. G. RECURVA; foliis lanceolatis parum mutatis scapum vestientibus, racemo denso secundo recurvo pubescente, sepalis abruptè acuminatis, labelli laminâ canaliculatâ oblongâ sacco vacuo duplò longiore.

Khasia, 5000–6000 feet, *J. D. H. & T. T.* (345).

A very distinct plant with a dense recurved one-sided raceme, and the scape clothed with leaves but little smaller than the others. The leaves are also narrower than in *G. marginata*, and not at all ovate.

48. G. procera, *Hooker, l. c.* (Cionisaccus lanceolatus, *Kuhl & Hasselt.* G. carnea, *A. Richard, Ann. Sc. Nat.* ser. 2. xv. p. 80.)

Assam, Naga Hills, *Griffith*; Sikkim, hot valleys, *J. D. H.* (291); Hong Kong, *Champion*; Ceylon, *Macrae*, *Thwaites*; Java, *Reinwardt*; Nilgherries, *Perrottet*, no. 1107, in the Herb. of M. de Franqueville.

A common plant subject to a little diversity in the sharpness of the sepals and petals, and in the degree of down upon the spike; but these states do not seem to require separate notice. An authentic specimen of *G. carnea*, obligingly sent me through M. Weddell, by M. Graves from the collection of M. de Franqueville, shows that plant to be merely a young state of this common species.

49. G. rubicunda, *Lindl. in Bot. Reg.* 1839, *Misc.* 92 (Ætheria rubicunda, *Rchb. fil. in Bonplandia*).
Philippines, *Cuming.*

This is certainly a plant of the same genus as *Goodyera procera*, and no *Ætheria*, as Prof. Reichenbach supposes.

XVI. GEORCHIS, *Lindl. Gen. et Sp. Orch.* p. 495.

50. G. cordata, *l. c.*
Khasia, at the height of 4000 feet, *J. D. H. & T. T.* (344), *Griffith.*

51. G. foliosa, *l. c.* (Goodyera, *Griffith, Ic.* t. 346. 1.)
Khasia, 3000–5000 feet, *J. D. H. & T. T.* (339); Sikkim, 3000–5000 feet, *J. D. H.* (331); Burma, *Griffith.*

This seems to be a common species, and subject to some differences in the degree of hairiness of its flowers and in the length of the bracts. The flowers are rose-coloured with a white lip and petals.

52. G. VITTATA; foliis ovatis acutis carnosis subtus purpureis supra vittis 3 pallidis, spicâ subspirali, floribus ovarioque glaberrimis, labello elongato canaliculato, petalis sepalo dorsali conformibus.
Sikkim, in hot valleys, *J. D. H.* (336).

Flowers much larger than in the last, with the pouch of the lip projecting beyond the sepals. Sepals pink; petals and lip white.

53. G. CALVA; foliis obliquis, spicâ oblongâ omninò calvâ foliis parum longiore, bracteis linearibus acuminatis herbaceis floribus multò longioribus, petalis obovatis.
Java, *Lobb.*

Much like some states of *G. foliosa*, especially in its unequal-sided leaves; in the length of the bracts it corresponds with the Sikkim state of that plant. But its short spikes, perfectly smooth ovary, and obovate petals induce me to separate it.

XVII. ÆTHERIA, *Endlich. Lindl. Gen. et Sp. Orch.* p. 490.

54. Æ. fusca, *Lindl. l. c.* p. 491.
Sikkim, 12,000–15,000 feet, *J. D. H.* (347).

55. Æ. MOLLIS; caule debili folioso, foliis ovatis acutis in vaginam ferè sessilibus, scapo vaginâ subherbaceâ in medio spicâque tenui elongatâ mollibus, sepalo dorsali lateralibus multò majore, petalis oblongis obtusis, labello bilobo callis in ventre sigmoideis.
Khasia, 3000–4000 feet, *J. D. H. & T. T.* (343); Burma, *Griffith.*

A slender plant a span high with small somewhat spiral soft flowers, white and green. "Lip adnate (glued?) to the margins of column," *J. D. H.*

56. Æ. anomala (Goodyera no. 10, *Griff. Notul.* iii. 394).
Forest at Tingree in Assam, among Tea-trees, *Griffith.*

It appears that Mr. Griffith found only two specimens of this remarkable plant, one of which is in my herbarium, from himself. The materials at my command do not permit me to determine with certainty the peculiar structure of its column and stigmatic apparatus, but there is evidently something very unusual in it. Griffith's words, restored to what he probably wrote, may be put thus:—"Saccus (labelli) intus utrinque et basin versus, continet processus cellulosos complanatos 2–3, apicibus crenato-repandis. Columna nana, hinc utrinque dente membranaceo aucta; facies antica centrum versus processum [habet] cellulosum cristiformem basi, mediante labello, c. dentibus lateralibus continuum. Stigma verum anticum inconspicuum, canali inter faciem anticam et faciem processiferam, quæ verosimiliter pars labelli. Stigma supra in rostelli processus 2 subulatos productum; facies postica, in alabastro, integra membranacea, basi in gibberem quasi inflatum." It appeared to me that the stigmatic surface consisted of a deep hollow opening vertically, and forming two faces, one of which is presented to the lip and the other to the anther. Possibly my specimen may be the specimen in which what Griffith regarded as a deformity occurred. It is much to be regretted that no other traveller should have met with this curious plant.

57. Æ. CORDATA; foliis cordato-lanceolatis, spicâ tenui pubescente, labello basi subconico apice obtusè bidentato.
Banda, *Reinwardt.*

The long cordate thin leaves are remarkable. In habit the plant resembles *Monochilus flavus.* The calli are thin, long, and falcate.

XVIII. DOSSINIA, *Morren in Ann. Gand,* iv. 171, *with a figure.*

58. D. marmorata, *Morren, l. c.* (Cheirostylis marmorata, *Lindl. in Van Houtt. Fl. des Serres,* 1848, t. 70.)
Khasia, at 4000 feet, *J. D. H. & T. T.* (366).

The specimens in the herbarium of Hooker and Thomson prove the inaccuracy of the Garden report, that this plant comes from Java, where no one has found it growing. From the following it differs in its hairy raceme, golden-veined roundish ovate leaves, and long falcate toothed appendage of the column. The figure in the 'Fl. des Serres' gives a good view of the general appearance of the plant, but the details are inaccurate.

59. **D. LANCEOLATA**; foliis lanceolatis acuminatis costâ suprà albâ, scapi vaginis 4 laxiusculis quarum inferior foliacea, spica et bracteis acuminatis pubescentibus, floribus distantibus ovariisque glabris, sepalis petalisque subæqualibus acutis, petalis semioblongis acutis sep. dors. agglutinatis supra columnam cucullatis, labello longè angustato tridentato intra ventrem 2-lamellato callis 2 carnosis circularibus dentatis, columnæ appendicibus 2 membranaceis liberis bilobis.

Khasia, near Pomrang; one specimen only seen, *J. D. H.*

About a foot high. Stem erect with three or four dark green leaves near the middle, each with a broad white band along the midrib; the petioles rose-coloured. Spike cylindrical, 2 inches long, of about fourteen distant rose-coloured flowers. The dorsal sepal and broad petals firmly glued to it form a wide hood completely overlaying the column and hypochil.

XIX. ZEUXINE, *Lindl. Gen. et Sp. Orch.* p. 485.

60. Z. sulcata, *l. c.* (Z. robusta, *Wight, Ic.* 1726. Z. brevifolia, *id. Ic.* 1725. Z. emarginata, *Lindl. l. c.*)

Peshawur, *Major Vicary*; Plains of N.W. India, *T. T.* (352); Plains of Behar, *J. D. H.* (*id.*); Ceylon, *id.*; Hong Kong, *Champion*; Assam, *Griffith*; Chittagong, *J. D. H. & T. T.*; Philippines, *Cuming.*

This very common plant is evidently extremely variable, and I think all the names above quoted certainly belong to it; *Z. emarginata* is a very small state. *Z. robusta* and *brevifolia* I cannot at all distinguish.

61. Z. membranacea, *l. c.* (486). (Z. bracteata, *Wight, Ic.* 1724 bis.)

Assam, Bootan, Sunderbunds, *Griffith.*

A much taller plant than the last, with long grassy leaves and a membranous lip.

62. Z. Tripleura. (Tripleura pallida, *Lindl. l. c.* p. 452.)

Hot valleys, Sikkim, *J. D. H.* (352).

Very like the last, but distinguished by its lateral petals being linear and spreading at right angles to the lip, which is oblong, concave, and abruptly terminated in an emarginate point. The proposal of the genus *Tripleura* was a great oversight.

XX. MONOCHILUS, *Wallich, in Lindl. Gen. et Sp. Orch.* p. 486.

63. M. longilabris, *Lindl. l. c.* (M. affinis, *R. Wight, Ic.* 1728.)

Ceylon, *Thwaites, Champion*; The Ghats, *Stocks* (13).

No doubt can exist of the above figure in Wight's Icones belonging to this, and not to *M. affinis*, a smaller two-flowered plant with a tomentose calyx, and shorter broader lip with a few crenatures.

64. M. nervosus, *l. c.*
Hot valleys in Sikkim, *J. D. H.* (341); Ceylon, *id.* (334).

65. M. flavus, *l. c.*
Ceylon, *Thwaites* (3120); Assam and Mergui, *Griffith.*

The lip seems to vary in the length of its lobes; in Mr. Thwaites's excellent sketches, in my possession, they are very short, broad, and rounded; in other cases they are deeply divided.

66. M. goodyeroides (Zeuxine goodyeroides, *Lindl. Gen. et Sp. Orch.* p. 486).
Mishmee Hills, *Griffith.*

"Sepals brownish flesh-coloured. Petals white." *W. G.*

Petals obovate, rather longer than the dorsal sepal. The habit being that of *Monochilus flavus*, and the dorsal sepal not being saccate, this requires to be removed from *Zeuxine*, in which I first placed it.

67. M. GALEATUS; foliis ovatis lineâ mediâ pallidâ, scapo basi univaginato, floribus glabris, petalis oblique obovatis sepalo dorsali adnatis et paulò longioribus, labello breviore apice rotundato.
Mishmee Hills, *Griffith.*

Very like *M. regius*, but the leaves are broader, the flowers smooth, the lateral sepals longer, the petals rounded and obovate, not linear and acute, and the lip rounded, not 2-lobed. The sepals are almost petaloid, and I have found no calli in the hollow of the hypochil.

XXI. CHEIROSTYLIS, *Blume, Bijdr.* 413. t. 16.

68. C. flabellata, *Wight, Ic.* 1727. (Goodyera flabellata, *A. Rich. in Ann. des Sc.* ser. 2. xv. p. 79. t. 12. Zeuxine moniliformis, *Griffith, Notul.* iii. 397. t. 350.)
Bootan, *Griffith.*

69. C. PARVIFOLIA, *Lindl. in Bot. Reg.* 1839. *Misc.* no. 21; spicâ elongatâ, labelli laminâ dentatâ sepalis vix longiore, stigmatis processubus acinaciformibus rostello æqualibus.
Ceylon, *Thwaites* (3071).

A slender plant, very like *Ætheria flava.* An excellent drawing and specimens from Mr. Thwaites show that it altogether agrees with *Cheirostylis* in the connate sepals and stigmatic processes, nor is it when young unlike *Ch. flabellata*, but the lip is wholly dissimilar. The specific character originally given was framed from a poor starved specimen; for that now described I am indebted to Mr. Thwaites.

70. C. pusilla, *Lindl. l. c.* p. 489.
Sikkim, 7000–8000 feet, *J. D. H.*; Khasia, *Griffith*, 3000–4000 feet, *J. D. H. & T. T.* (325).

71. C. GRIFFITHII (Goodyera no. 9, *Griff. Not.* iii. 393); foliis ovatis acutis, scapi glabriusculi vaginis 2 laxis acuminatis, spicâ 1–3-florâ, labello basi subgibboso columnæ faciei arctè adnato inde in unguem linearem producto apice dilatato multifido, columnæ falcibus setaceis acutissimis.
Khasia, *Lobb*; in the woods of Mamloo, *Griffith*.

Of this remarkable plant I have three specimens from Griffith, and one gathered by Lobb. They are from 4 to 6 inches high, with a few ovate thin leaves, a pubescent scape with two amplexicaul lanceolate sheaths, and a solitary bract of similar size and form. The flowers are 1–2, or 3 in number, nearly smooth, barely ½ an inch long, with the parts forming an almost cylindrical tube 4–5 lines long.

In the foregoing enumeration I have reserved what I wish to say respecting the new genera which it contains till I could bring into one general view those Neottian Orchids that constitute the group of PHYSURIDS.

From the analytical table given in the *Gen. et Sp. Orch.* p. 443, there must be excluded *Plexaure*, Endl., ascertained to be a *Phreatia* by Professor Reichenbach, junior; *Ulantha*, Hooker, which is a *Chloræa*; and *Galera*, which belongs to *Arethuseæ*. The remainder require rearrangement, which I propose to effect as follows.

The genera fall into three groups, of which one has a lip with a distinct spur or pouch at the base; another a mere swelling; while the third has neither the one nor the other, but is nearly flat next the column.

In the first, or *calcarate* group, there is nothing to add or alter. The second, or *ventricose* group, requires both correction and addition.

Macodes has been described as having a twisted column and lip like *Hæmaria*; this was a mistake originating with Blume's artist. An examination of a specimen collected by Junghuhn (no. 282), for which I am indebted to my learned friend Prof. De Vriese, shows that the column and lip are straight as usual, that the two great "tubercles" at the foot of the column are a pair of hooked processes analogous to what occur in *Cheirostylis*, *Anæctochilus*, &c., that the rostellum is petaloid, and that the lip, which is dorsal, bears at its base the two fleshy calli characteristic of *Ætheria*, *Cheirostylis*, *Spiranthes*, &c.

From *Cheirostylis* must be separated Morren's *Dossinia*, on account of its ventricose labellum, the double petaloid deflected process of its style, and either a tubercle or a double vertical plate situated at the base of the epichil.

From *Goodyera* three forms require to be distinguished. Firstly, Achille Richard's *Platylepis*, the *Goodyera occulta* of Du Petit Thouars, the lip of which has a pair of calli within the base, and a long column, the stigmatic area of which is bordered by a membrane; for this, of which I have a second species from Tahiti, I propose the name of *Notiophrys**, that of *Platylepis* being now admitted among *Cyperaceæ*. A second genus is the section of *Goodyera*, which I formerly called *Rhamphidia* (Gen. et Sp. Orch. p. 494), and at a later period *Cerochilus*, distinguished from *Goodyera* by its dorsal lip with calli instead of hairs within, and from *Macodes* and *Rhomboda* by the want of appendages on the column. The last-mentioned genus is founded upon a most remarkable plant, native of Sikkim, with a great saccate dorsal lip, a truncate column having quite a funnel-shaped anther-bed, and a pair of large, soft, tooth-like transverse processes in front, resembling in form the mandibles of a coleopterous insect, added to which the customary calli within the base of the lip are so large and thin as almost to deserve the name of petaloid. Of the importance and signification of these processes I hope to offer some explanation on another occasion.

The last group, in which the base of the lip is flat, consists of four certain genera, *Chloidia, Zeuxine, Monochilus*, and *Cheirostylis*, to which may possibly be added Blume's *Eucosia*, a plant which I have found nowhere, and of which the figure is perhaps as inaccurate as that of *Macodes*.

In order to bring the differences among the genera of Physurids into a more distinct view, the following analytical table has been prepared.

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* Sp. 1. *N. occulta* (Goodyera occulta, *Thouars*; Platylepis goodyeroides, *A. Rich.*; Ætheria occulta, *Lindl.*); bracteis ventricosis floribus longioribus, labello indiviso, sepalis pilosis.—Mauritius.

Sp. 2. *N. Commelynæ*; bracteis planis acutis ovarii longitudine, labello apice 3-lobo, sepalis glabris.—A foot and a half high. Leaves three, stalked, oblong lanceolate acuminate, shorter than the scape, which has three close-pressed sheaths and is downy under the spike. Spike itself and ovaries downy, 4 inches long.—Found once only in Tahiti by Bidwill (who at first took it for a *Commelyna*), on a rock, in the bed of a stream, in the valley of Fataua, about a mile beyond the native camp.

ORCHIDACEÆ, NEOTTIEÆ, *Physuridæ*.

A. *Labellum calcaratum.*

Columna labello sub apice bilamellato adnata .... HERPYSMA.
——— libera.
Petala columnæ dorso adnata .... BASKERVILLA.
——— libera.
Columna anticè tuberculis aucta .... ANÆCTOCHILUS.
——— inappendiculata .... PHYSURUS.

B. *Labellum basi manifestè ventricosum.*

Columna torta .... HÆMARIA.
——— recta, elongata, col. adn. Sep. et pet. reflexa .... MYODA.
——— ———, ———, libera. Sep. et pet. conniventia.
Labellum nudum. Stigma planum .... NOTIOPHRYS.
——— 2-lamellatum. Stigma 2-labiatum .... TROPIDIA.
Columna nana.
Labellum posticum, galeatum.
Columna sub stigmate 2-tuberculata.
Stigma rostratum petaloideum .... MACODES.
——— truncatum .... RHOMBODA.
Columna nuda .... RHAMPHIDIA.
Labellum anticum.
Sep. dorsale basi galeatum .... HYLOPHILA.
——— ——— rectum.
Columna anticè inappendiculata.
Labellum intus pilosum. Stigma planum .... GOODYERA.
——— ——— ———. ——— infundibulare ...... GEORCHIS.
——— ——— callosum .... ÆTHERIA.
Columna processu duplici petaloideo deflexo sub stigmate aucta .... DOSSINIA.

C. *Labellum basi planiusculum.*

Columna elongata. Labellum 2-lamellatum .... CHLOIDIA.
——— nana, sepalo dorsali basi galeato v. saccato .... ZEUXINE.
——— ———, ——— ——— recto.
Labellum acuminatum, intus villosum .... EUCOSIA.
——— apice expansum.
Columna simplex .... MONOCHILUS.
——— anticè bifalcis .... CHEIROSTYLIS.

Note respecting certain Glandular Appendages of the Leaves in the Autumn Rosettes of *Epilobium montanum*. By DANIEL OLIVER, Jun., Esq. F.L.S. &c.

[Read December 2nd, 1856.]

[Abstract.]

MR. OLIVER notices the younger leaves of the autumnal radical rosettes of *Epilobium montanum* as exhibiting glandular append-

ages, which, so far as he has been able to ascertain, are undescribed. They occur on the apices of the younger and nascent leaves, and may be readily observed, assisted by a simple lens, by removing the outer fleshy, alternately opposite pairs, until but from two to four or five pairs remain around the *punctum vegetationis.*

The outer leaves provided with the 'gland' present it as a yellow-brown, or brown-black apical process, evidently evanescing and about to fall away. These glands, which are somewhat ovate-conical or oblong in form, are erecto-patent, or deflexed towards the back of the leaves; thus, when seen in profile or from above, they radiate from the axis of the sprout. The external leaf-scales, which, doubtless, in their early condition had been in like manner furnished with these organs, do not exhibit any very perceptible scar at the point of their former attachment. The 'glands' appear to be in their matured and perfect condition on but the very young leaves, the contents of the large cells composing them assuming, more especially towards the base and middle portion, a yellowish-brown colour, and at the same time becoming more opake, and probably granular, as they remove from the termination of the axis. The perfect 'gland' consists of numerous, comparatively large cells, filled with a clear watery cell-sap, becoming yellowish on the application of tincture of iodine. In some cases perhaps they are almost pedicellate, though generally they may be termed sessile, and resting upon the apex of the leaf. They appear in almost the earliest stage of the nascent leaf, forming, when the succeeding pair becomes visible, an appendage of considerable relative size.

The minute buds in the axils of the cataphyllary leaves of these rosettes are also furnished with these organs.

Mr. Oliver considers the function and purpose of these glands, as in many and parallel cases in structural botany, to be enveloped in obscurity. He suggests that it would be desirable that some observer having at hand fresh specimens of allied *Epilobia* and other *Onagraceæ* producing 'rosettes' towards the cold season, should take the pains to institute a more comparative examination of these structures, which possess, he thinks, considerable interest.

Mr. Oliver's Note was accompanied by illustrative microscopical drawings of the structures indicated.

Description of a New British Species of *Draparnaldia*.

By J. B. Hicks, Esq., M.D., F.L.S.

[Read November 18, 1856.]

I found the following *Draparnaldia* two years since, and again this year, in the bog-streams of the New Forest, Hampshire. I have been unable to find it described in any of the works which I have obtained; I have therefore named it *Draparnaldia cruciata*, from the cruciate arrangement of its parts, and beg leave to submit a description as follows:—

Draparnaldia cruciata, *Hicks*.

Frond 3 to 4 inches long, light green, paler than *Drap. plumosa* or *D. glomerata*, having a flocculent appearance in water; when removed it is highly mucous. ***Main filament***—cells fasciated, very slightly inflated, 3–4 times longer than wide, about 330th inch diameter. ***Ramuli*** proceeding from main filament at right angles, mostly in whorls of four, cruciately; the intervals between the principal ramuli great, about every 50–60 cells of main filament between them; cells as wide as long, especially the younger, not fasciated. ***Ultimate tufts*** springing in a cruciate manner from the ramuli; their branches springing nearly at right angles gives them an arborescent appearance, bearing cilia of extreme tenuity and length. The tufts also arise from the main filament at about every 5–10–20 cells distant. From the base of the ramuli, and even from the smaller tufts, roots arise very freely, which coil round the filament many times; sometimes the end diverges from it, and becomes a small tuft. These rooted ramuli becoming disengaged float away, and form another plant. The main filament and ramuli are invested with a most perceptible layer of *mucus*, about 6 diameters of the cell. This layer is less seen after the plant has been kept for a day or two in a glass, when it will be found covered with the spores that have been generated. *The spores* are not so large as those of *D. glomerata*, being about $\frac{1}{214}$ th inch long diameter and $\frac{1}{3750}$th short ditto, with cilia.

This species is found attached to sticks and stones in streamlets issuing from some of the New Forest bogs. In its young state it is of a very pale yellow-green, but when older it is rather greener. It may be easily distinguished from *Drap. glomerata*, *D. plumosa*, and *D. tripartita*, 1st, by the ramuli diverging at right angles; 2ndly, by the cruciate arrangement throughout; 3rdly, by the perceptible mucous sheath, thus drawing it closer to the genus *Chætophora*; 4thly, by the excessive length of the cilia; 5thly, by the extraordinary length and frequency of the radicles; 6thly, by the more equal width of the main cells, as also their greater length; 7thly, by the stiff and formal appearance of the larger tufts, so unlike the thick flexible tufts of the other species. The long interval between the ramuli gives the main filament a much more naked appearance.

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ERRATUM.

At p. 129, l. 16, *for* ASIMINA *read* ASCARINA.

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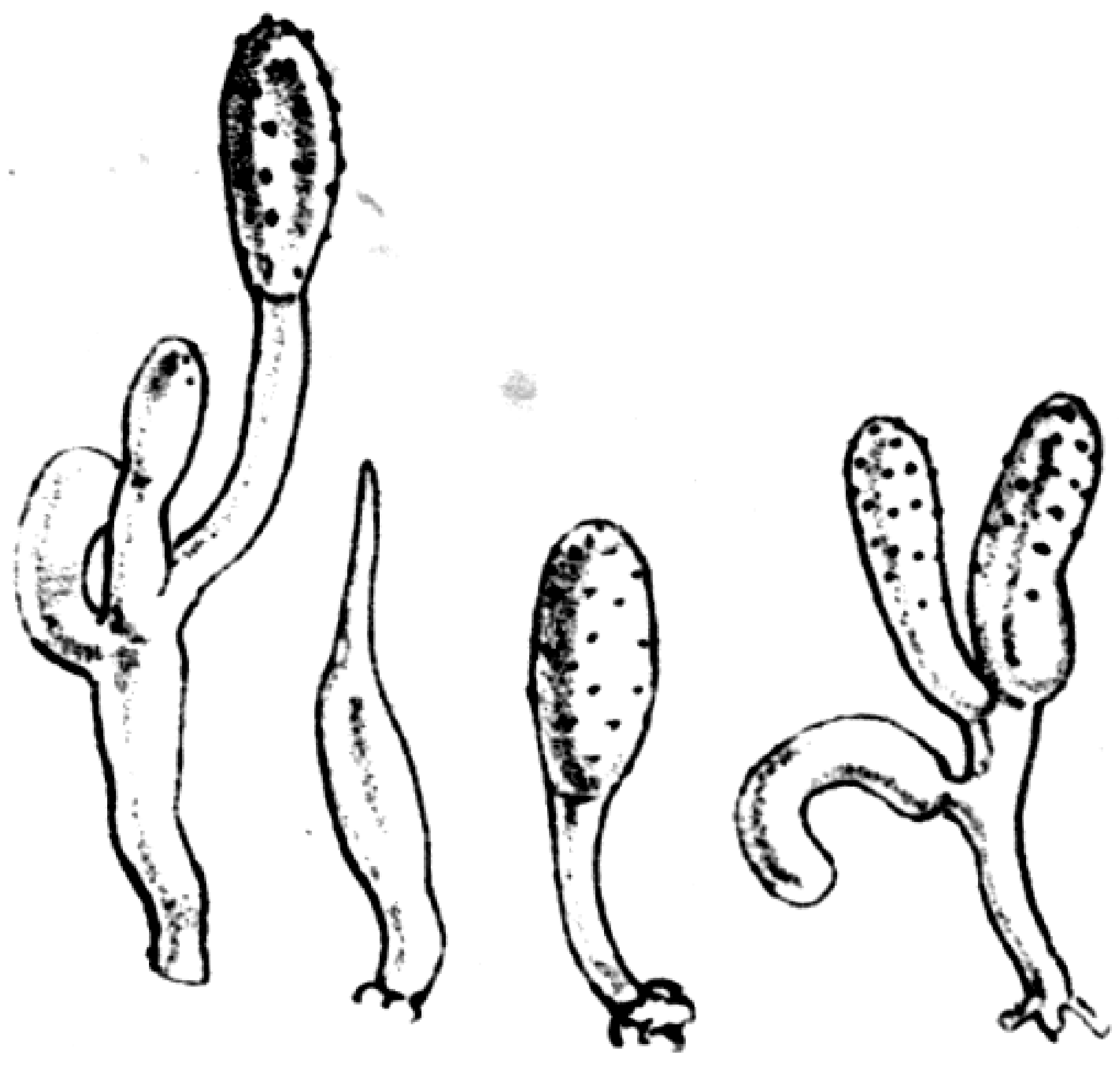

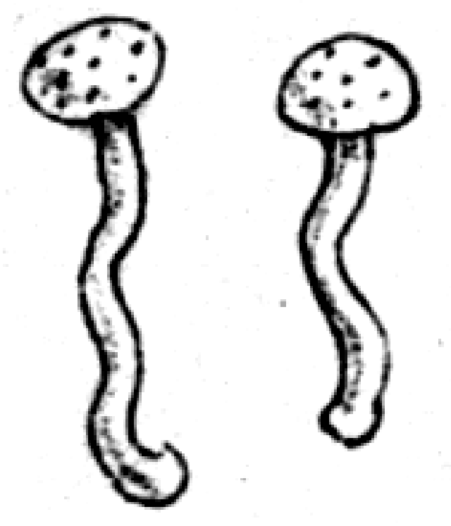

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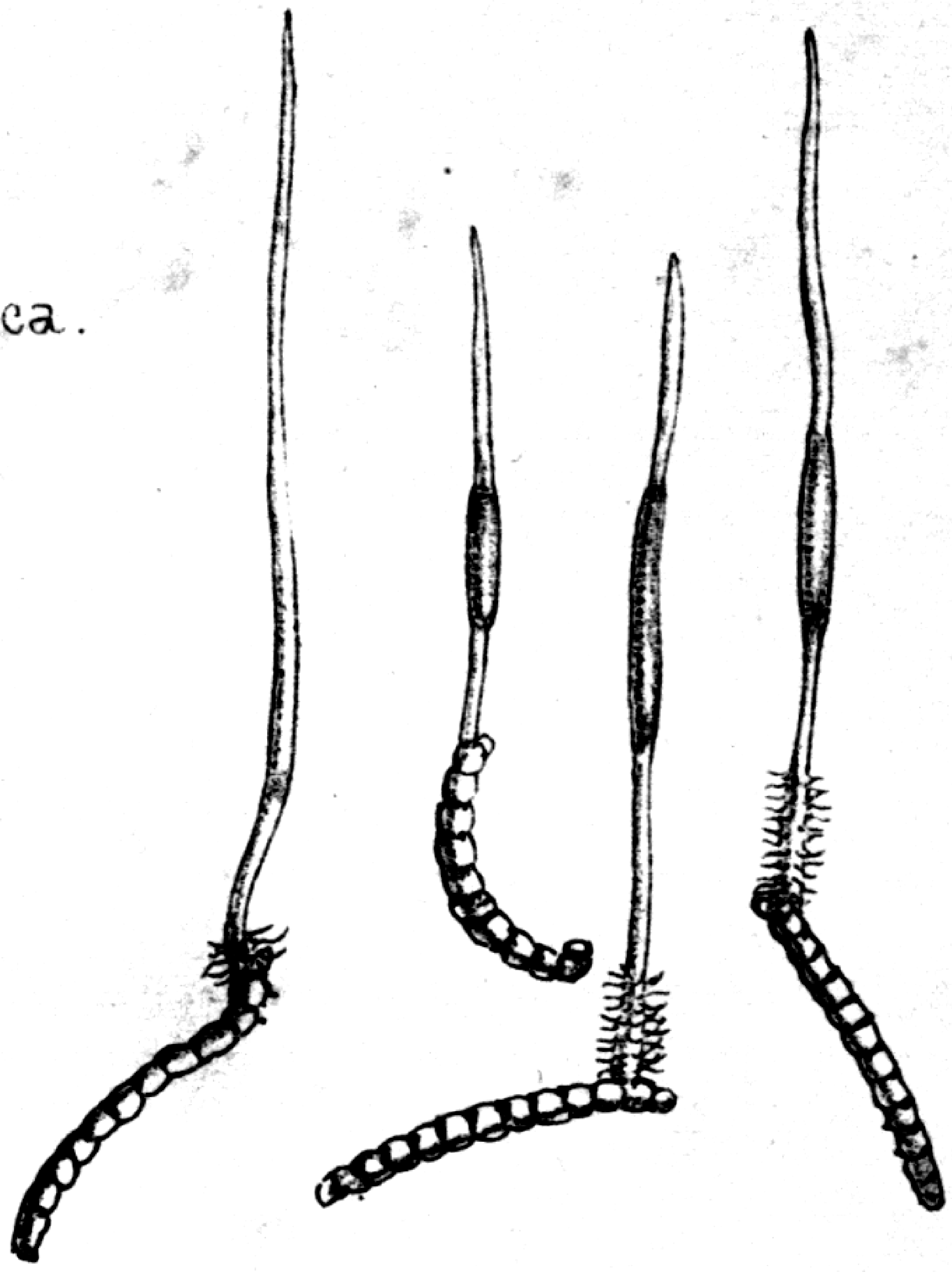

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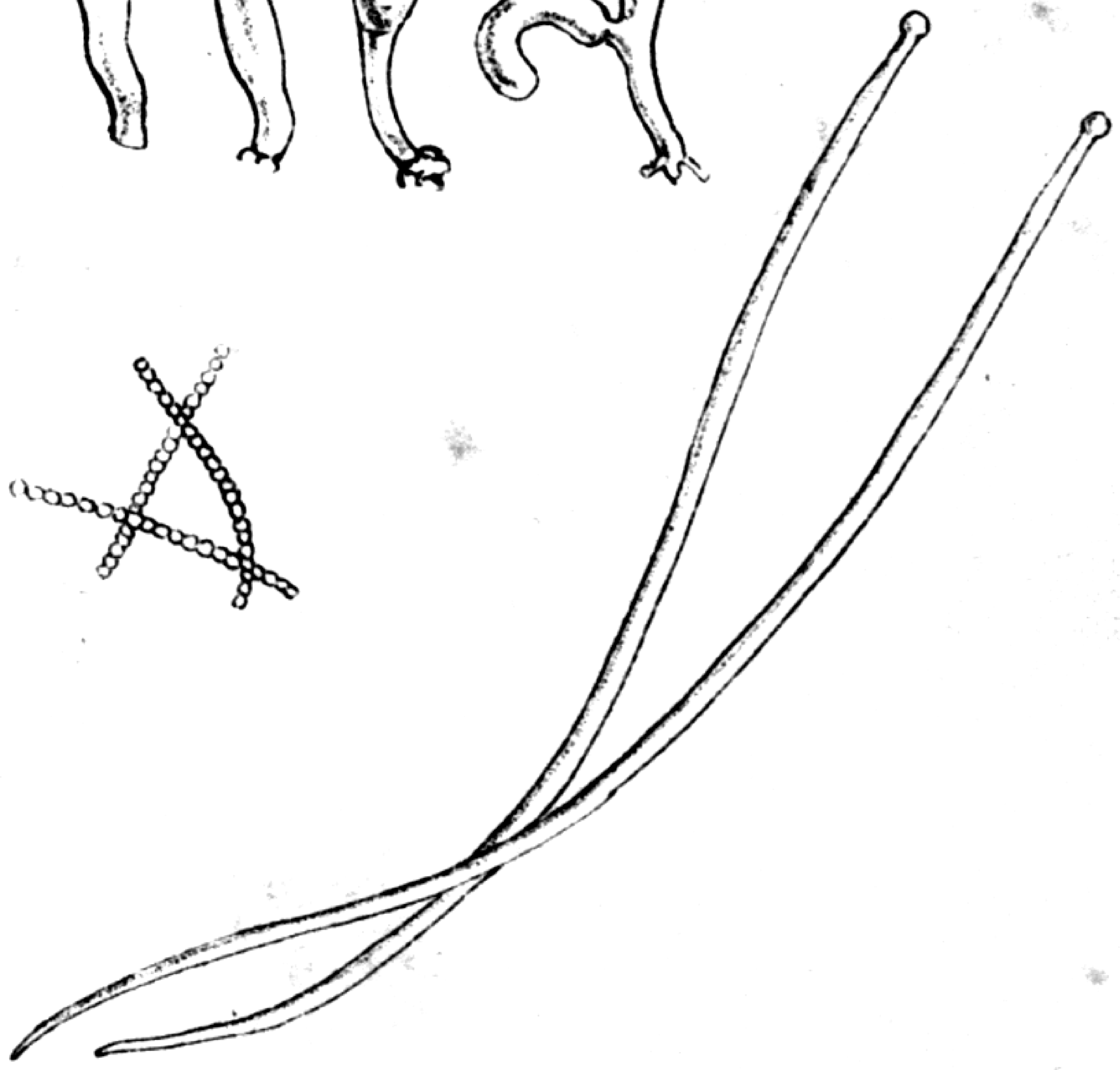

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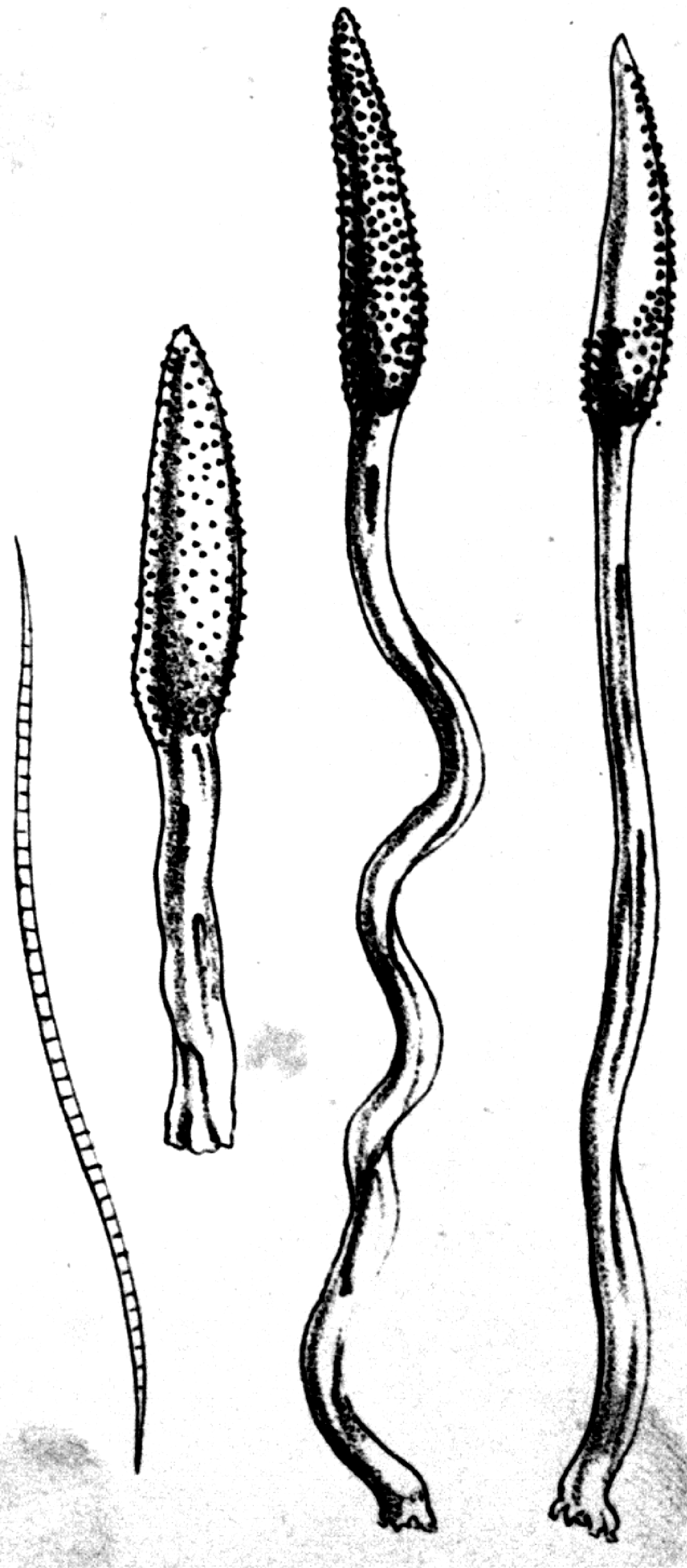

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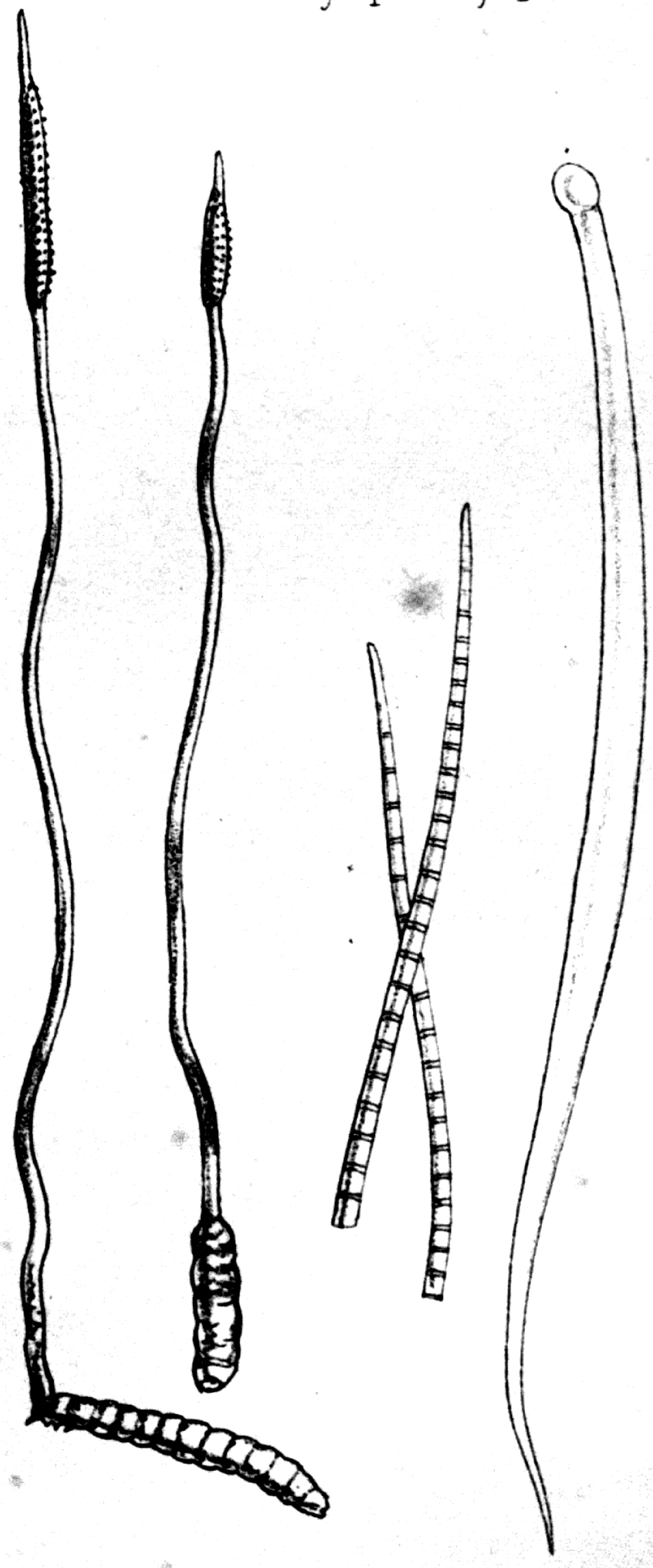

C. acicularis.

M. J. Berkeley del W. Fitch lith.

Vincent Brooks Imp.

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Pilobolus roridus.

F. Currie del. W. Fitch lith.

AEa

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OF

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JOURNAL OF THE PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

Præcursores ad Floram Indicam: being Sketches of the Natural Families of Indian Plants, with Remarks on their Distribution, Structure, and Affinities. By J. D. HOOKER, Esq., M.D., F.R.S. & L.S., and T. THOMSON, Esq., M.D., F.R.S. & L.S.

[Read March 3rd, 1857.]

IT is our intention to offer to the Linnean Society, from time to time, systematic sketches of the Natural Orders of Indian Plants, chiefly derived from a careful study of the materials upon which we have both been for many years engaged.

We have been induced to draw up the present papers for two reasons: first, because no satisfactory advance can be made in the general botany of India, at the present time, except by the study of the Indian Herbarium now deposited at Kew, whilst many years must elapse before an equally extensive and complete series of specimens can be elsewhere brought together; and secondly, because the careful collation of these with each other, and with the Hookerian herbarium at Kew (of which indeed they form a part), supplies us with a vast quantity of invaluable data in botany, which must otherwise remain for years unpublished.

It was indeed mainly the unprecedented extent and intrinsic value of the Indian collections placed at our disposal by Sir W. J. Hooker, coupled with a request from the President and Council of the British Association, that induced us to found a work upon them, designed to contain a complete account of the vegetation of India in all its aspects. The first volume of our 'Flora Indica' was printed in 1855, and we must refer to its introductory essay for a history of the rise and progress of Indian botany, and for details of the principal collections on which these sketches will be founded*. Being unable to continue that work at present, we venture to hope that a temporary substitute, giving such an account of what it should consist of, as the following pages supply, may be acceptable to our fellow-botanists.

The Præcursores are intended to be literally what their name implies: to ourselves they will be a synopsis of the materials placed in order for critical study, when we shall be able to continue the 'Flora Indica'; and they may further be regarded as *præmonenda* for our contemporaries or successors, who may be about to study Indian plants, and who will gather from them a tolerably correct idea of the nature and extent of any Natural Order they may undertake to study; besides a certain amount of definite botanical information on each, and many indications of researches to be undertaken and investigations to be followed up.

It is not easy to say how far sketches of this kind can be considered as exponents of the vegetation of a country so extensive as India, extending in elevation from the level of the sea to 18,000 feet, and in area from Malacca to Afghanistan, and from Ceylon to Tibet; and still less can they be guides to the writings of the numerous botanists whose labours on Indian plants are scattered over the whole field of botanical literature. Our own researches, it is needless to say, cannot be much extended beyond a careful comparison with the best authorities of the 12,000 species and 300,000 specimens which we have to examine and classify, and which must pass many times under our scrutiny during the progress of the arrangement of the great Herbaria from which we derive our materials. In the course of such an undertaking as this, though conducted with every precaution, under every advantage of books, the best-named Herbaria in Europe, and the constant revision and assistance of several distinguished botanists at Kew, so many mistakes must occur, that it is with great diffidence that we publish our first crude results in the present incomplete form. On the other hand, it is obvious that the collation of such Herbaria and books must yield at every stage of its progress a vast number of data regarding the distribution, structure, affinities, and nomenclature of Indian plants, which no other circumstances could elicit, and which no more detailed or critical investigations can afterwards subvert; and it is these which will give the chief, if not the whole, value to our sketches.

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* In addition to the collections there enumerated, we have to add the names of the following gentlemen who have contributed to Sir W. Hooker's very valuable materials for the 'Flora Indica': Dr. Ritchie of Bombay, an extensive collection from Concan and the Deccan, &c.; Dr. M'Clelland, a very large Pegu herbarium; the Rev. Mr. Foulkes, a considerable Peninsular collection; the Rev. Mr. Johnson, Cochin plants; Mr. Bartle Frere, Beloochistan plants. We have also to state that the whole of the late Dr. Stocks' collections have been incorporated with the duplicate Indian herbaria for distribution along with our own, and that we have to acknowledge the receipt of many valuable additional collections from Messrs. Edgeworth, Thwaites, Schmidt, Wight, and Law.

These data, if systematically collected and arranged, will assume the shape of a tolerably complete *catalogue raisonné* of the Flora of India, which will be most full and accurate as regards the number and distribution of the species, and least so as regards references and synonyms, and the limits of critical species*. In the process of collecting them, we should in many cases be enabled to form more correct estimates of the relative value of those morphological differences upon which natural orders and genera are founded, than we could by a closer study of fewer species or genera; and we should be enabled to appreciate the effects of exposure, elevation, temperature, humidity, and other external agents, in modifying the characters of organs, which escape observation in the detailed study of a few specimens from a few localities only.

It remains to say something of the plan of these Præcursores. They are intended to comprise catalogues of all the plants known to us in each Natural Order; and these, or groups of these, will be prefaced by some general remarks. Well-known species will, in most cases, be simply named, and only such synonyms and references added as appear worthy of notice, and are not to be found in DeCandolle's 'Prodromus,' and other works of standard authority in general use. We shall in many cases add as doubtful synonyms, names of plants which we have reason to think may be such, or which at any rate deserve a closer comparison than we can give. These references are, therefore, on no account to be considered as anything but suggestions. We shall give characters of new genera and species, with indications of their affinities; and we shall in some cases give monographs of imperfectly known genera. The localities will always be fully given, in accordance with the plan proposed in the 'Flora Indica,' and illustrated in the map of botanical provinces appended to that work. Following the habitats will be a brief guide to the extra-Indian distribution of the species.

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* At least in the opinion of those who regard the essence of specific botany to be the successful searching after differences, however minute, rather than estimating the value and significance of such differences, and tracing identity of plan and structure under diversities of aspect, form, and external conditions.

SERIES I. STYLIDIEÆ, GOODENOVIEÆ, ET CAMPANULACEÆ (including LOBELIACEÆ).

We commence these sketches with the Gamopetalous *Epigynæ*, from their having been recently under our examination, and not from any considerations connected with their position in the series of Dicotyledonous plants. Their title to rank high in that series will, however, be considered very strong by those who regard cohesion and adhesion of the floral whorls, and a great deviation from the typical leaf, in the organs of which these consist, as certain indications of high development in a plant.

Of the *Stylidieæ* and *Goodenovieæ* there are very few representatives in India, though the former order reaches its northern and western limits in that country; advancing to Silhet in N. lat. 25°, and as far west as Ceylon, and we believe also Orissa; for though we have seen no specimens, a species is reported by Griffith to have been found in that country. Of the three Indian *Stylidieæ*, none are the same as New Holland species; but one, the *Stylidium uliginosum*, is certainly also found at Hong Kong. Hitherto it has been detected in no part of India except Ceylon, but it is so very nearly allied to the *S. Kunthii* of the Malayan Peninsula, Chittagong and Silhet, that it may prove to be a variety of that plant.

The *Goodenovieæ* are represented by two very widely distributed and variable littoral species: one of these appears to be the *Scævola Plumieri* of the West Indies, and is also found on both coasts of tropical Africa and in the Galapagos Islands; the other is also a Mauritius and Madagascar species, but has a wider eastern distribution than *S. Plumieri*, being spread over the Malayan islands, and the tropical coasts of Australia and Polynesia; it has many names, and is the *S. Kœnigii*, Vahl, of which *S. sericea*, Forst., is only a state, with more copious silky hairs on the stem and in the axils of the leaves, than are ever found in the Indian plant.

Under *Campanulaceæ* we have included the *Lobeliaceæ* as a tribe, considering that they have no sufficient claims to rank as a separate order. It is true that the limits between these tribes are seldom disputed; but they are of very little value, and are founded on characters common to many species of both. The character most relied on is the connate anthers of *Lobeliaceæ*, but these are found in *Symphyandra* of *Campanulaceæ*, whilst various *Lobeliaceæ* have free anthers. Even the irregular corolla affords no good mark, for some states of the Australian *Wahlenbergia saxicola* have an oblique corolla, and unequal inclined anthers, of which two have the connective produced into an appendix, thus imitating a prevalent feature of *Lobeliaceæ*. In both tribes the fruit is either baccate or capsular, and in each the dehiscence takes place sometimes above and sometimes below the limb of the calyx.

The Indian *Lobeliaceæ* offer few structural peculiarities. We have, however, been obliged to found a new genus upon a remarkable and handsome species from the Sikkim Himalaya, identical with a mountain plant of Java, which we suppose to be the *Lobelia montana* of Blume.

The Indian *Campanuleæ* are a more extensive and very instructive tribe, and we have several remarkable forms to add to those which have been so well illustrated by Alphonse DeCandolle in his elaborate and able monograph. Of these novelties *Codonopsis* and its allies are the most anomalous, including as they do the beautiful genus *Cyananthus*, which, following Bentham, we unhesitatingly refer to this group, and which is indeed scarcely separable by technical characters from *Wahlenbergia* itself. In the 'Illustrations of Sikkim Himalayan Plants,' we figured the most remarkable Indian forms of *Codonopsis*, regarding several of them as subgenera, though founded upon extreme deviations from the prevalent arrangement of the floral whorls in *Campanulaceæ*. Our friend M. DeCandolle has since communicated to us by letter some valuable criticisms on the course we adopted; pointing out that some of the characters which we held to be of only subgeneric value, are of even ordinal value in other families of plants; and further, that if these subgenera are to be permanently considered as such, almost all the genera of *Campanulaceæ* may be merged into one. Of this we were perfectly aware, and indeed of more than this; namely, that the whole question of what should or should not constitute a genus, is involved in the consideration of the limits of such a group as *Codonopsis* and its allies; and although, in accordance with M. DeCandolle's views, we have now raised these subgenera to the rank of genera, we have by no means altered our opinion of their relationship, and still less of their structural peculiarities. Indeed we have little doubt that, could we undertake a revision of the whole Order, these and many other of the present genera would be reunited as subgenera of larger groups.

Upon this subject we take the liberty of reading a note on the principles upon which genera should be established in Botany, communicated to us by Mr. Bentham, who has kindly embodied the views which we hold in common with him, in a memorandum* appended to this communication.

The genera of *Campanulaceæ* are indeed, for the most part, quite artificial; and of this the best proof we can offer is to be found in the study of those already founded, and especially of the allies of *Codonopsis*. These include plants so nearly connected by natural characters of habit, colour, odour, and habitat, as well as by the structure of their flowers, that their close affinity has never been doubted; but some of them present more striking differences from one another, and more remarkable deviations from the common plan on which the Order is constructed, than any other plants in it. By far the greatest peculiarity is exhibited by *Campanumœa* and *Cyclocodon*, genera which present the paradox of a *calyx inferus* and a *corolla supera*. In *Cyclocodon* this anomaly is carried to the highest degree, the sepals being in *C. parviflorum* placed on the peduncle of the flower, far removed from the base of the corolla and ovary, whilst in *C. truncatum* and in *Campanumœa* they adhere to the base of the tube of the corolla. So remote from one another are the points of insertion of the calyx and corolla in both these instances, that the sepals have been described as leaflets of an involucre, though their development is opposed to this conclusion, and their æstivation is normally valvate. In *Codonopsis* the calyx is adherent to the base of the ovary, and the corolla is inserted at the point where the lobes of the calyx are given off: but so similar in other respects is one species of this genus to one of *Campanumœa*, that they can with difficulty be distinguished, except by a close comparison: and both these last-named genera again differ wholly from *Cyclocodon* in their ramification, large tuberous roots, twining stems, and fœtid milky juice.

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* See p. 30 of this volume.

Leptocodon is a third genus, containing one species, entirely agreeing with *Codonopsis* and *Campanumœa* in its habit, ramification, and fœtid juice, and with the former genus in the structure and adhesions of its calyx, corolla, &c., but having five staminodia alternating with its stamens, and few ovules fixed to placentæ which are not in the axis of the cells of the ovary, but on the walls of the dissepiments.

Turning to the fruit of these genera, we usually find in *Codonopsis* a membranous or baccate fruit, bursting by three horny valves within the base of the corolla; but in *C. inflata* these valves appear to be obliterated, and the fleshy berry scatters its seeds by decay of its walls, like that of *Campanumœa* and *Cyclocodon*.

In dividing these difficult *Campanulaceæ* into genera, M. DeCandolle has laid much stress on the relation of the cells of the ovary to the calyx-lobes; but these, being rarely equal in number, are seldom available for technical characters. In *Campanumœa*, the sepals alternate with the ovarian cells; in *Cyclocodon*, they are opposite; in *Codonopsis rotundifolia* (when 5-celled), they are normally opposite, I believe, though I find some observations recording the contrary amongst my notes on the live plant.

Thus in keeping up the four genera, *Campanumœa*, *Codonopsis*, *Leptocodon*, and *Cyclocodon*, we find ourselves obliged to go beyond M. DeCandolle, who, in his last revision of the *Campanulaceæ* (Prodr. vol. vii.), places all the species of *Codonopsis*, as restricted by us, in *Wahlenbergia*, and retains the name *Codonopsis* for Wallich's *C. truncata* and *C. parviflora*, also keeping up Blume's genus *Campanumœa*. But as one of his species of *Campanumœa* is identical with *Codonopsis parviflora*, Wall., and the typical species of *Codonopsis* differ from *Wahlenbergia*, it is necessary to remodel all these genera. In the mean time, considering the present state of the genera of *Campanulaceæ*, we have thought it better to adopt M. DeCandolle's opinion, and raise the subgenera of *Codonopsis* to the rank of genera.

The only other important observation to which we would call attention, is the presence in the same individual of some species of *Campanula* of two forms of flowers, differing remarkably, not only in size and appearance, but in structure; of these one kind is normal, the other very minute, generally on very long and more slender pedicels, with a more globose ovary, differently formed (often more foliaceous) sepals, and no corolla or stamens. These dimorphous flowers sometimes occur on the same plant; at others, individual plants will present only one form of flower. Such species are of course polygamous, and in some cases the two forms would at first sight be referred to different divisions of the genus, and have indeed been described as different species by our predecessors. The small flowers appear, and arrive at maturity, contemporaneously with the large, and like them produce abundance of seeds. So far as we are aware, this singularity is confined to the Indian species, for we have failed to detect it in the Persian ones that are nearly allied to the Indian, or in any others, though we have searched for them with some care throughout the extra-Indian species. Though unnoticed, we believe, by any naturalist, this dimorphism is a very prevalent character of several species, both tropical and temperate, including the most common of all (*C. canescens*, Wall.).

Nat. Ord. STYLIDIEÆ.

1. ***Stylidium Kunthii,*** **Wall.** **An var.** ***S. uliginosi?***
Hab. **Arenosis Bengaliæ orientalis; Silhet!** ***Wallich,*** **&c., et Chittagong! necnon in Peninsulâ Malayanâ ad Mergui!** ***Griffith*** **(fl. temp. frigid.) (v. v.)**

2. ***Stylidium uliginosum,*** **Swartz.**
Hab. **Insulâ Ceylon!** ***Walker, Champion.—Distr.*** **Chinâ meridionali ad Hong Kong.**

3. ***Stylidium tenellum,*** **Swartz.**
Hab. **Peninsulâ Malayanâ ad Malacca! et Mergui!** ***Griffith.***

Nat. Ord. GOODENOVIEÆ.

1. ***Scævola Kœnigii,*** **Vahl.—*S. Bela Mogadam,* R. & S.—*S. Lambertiana,* de Vriese.—*S. chlorantha,* de Vriese.—*S. Taccada,* Roxb.—*S. sericea,* Forst. est varietas ramulis, axillis, &c. barbatis.**
Hab. **Littoribus oceani ad Ceylon!** ***Champion;*** **Martaban! Concan! et Scinde!** ***Dalzell, Stocks,*** **&c. necnon in Peninsulâ Malayanâ!** ***Wallich,*** **&c.—*Distr.* China! ins. Oceani Indici! et Pacifici! Mauritius! et Madagascar!**

2. ***Scævola Plumieri,*** **Vahl.—*S. Thunbergii,* Eckl. & Zeyh.—*S. uvifera,* Stocks (Wight, Ic. 1613).—*S. Senegalensis,* Presl.**
Hab. **Littoribus oceani ad Ceylon!** ***Herb. Thwaites,*** **1777; Malabar et Scinde!** ***Vicary & Stocks.—Distr.*** **Africa tropica! India occidentalis! et in insulis Galapagœis!**

Nat. Ord. CAMPANULACEÆ.

Tribe I. CAMPANULEÆ.

Gen. I. CEPHALOSTIGMA.

1. *Cephalostigma paniculatum*, A. D.C.
Hab. Birmâ ad Prome! *Wallich.*

2. *Cephalostigma hirsutum*, Edgew. in Linn. Trans. xx. p. 81.—*C. Schimperi*, Hochst. Plant. Abyss. 69.—*Wahlenbergia perotifolia*, W. & A., Wight, Ic. 842.
Hab. Collibus siccis Himalayæ occidentalis; Kumaon! *Strachey & Winterbottom*; montium Khasia! (alt. 4000 ped.) et Peninsulæ! *Wight, Stocks, Law, Dalzell,* &c. (fl. Sept.) (v. v.)—*Distr.* Abyssinia.

3. CEPHALOSTIGMA FLEXUOSUM, Hf. & T. **Caulibus hispido-pilosis simpliciusculis gracillimis flexuosis superne paniculatim ramosis, ramis filiformibus, foliis sessilibus late ovato-oblongis obtusis subsinuato-dentatis supra glaberrimis subtus secus costam et nervos sparse pilosis, floribus gracile-pedicellatis, calycis tubo late hemisphærico lobisque hispidis, corollæ profunde 5-fidæ lobis lineari-oblongis calycem paulo superantibus, filamentis basi rhombeis ciliatis, stylo exserto, stigmate capitato 3-lobo.**
Hab. Concan! *Dalzell, Stocks.*
Herba 5–8 uncialis, caule angulato; *folia* ¾ unc. longa, interdum in petiolum brevem angustata, marginibus glabris ciliatisve.—*C. hirsuto*, Edgew., accedit, sed differt conspicue caule graciliore flexuoso, foliis multoties latioribus non undulatis, pedicellis longioribus, calyceque setis longis rigidis hispidulo.

Gen. II. CAMPANUMŒA, *Blume.*

Calyx inferus; *sepala* 5 basi ovarii adherentia, patentia. *Corolla* supera, campanulata, breviter 5-loba. *Stamina* 5, libera, filamentis filiformibus basi subdilatatis; antheris oblongis. *Discus* epigynus depressus, obscure lobatus. *Ovarium* depresso-globosum, 5-loculare, basi 5-costatum; loculis multiovulatis, ovulis multiseriatis placentis crassis axillaribus adnatis; *stigma* clavatum, 5-lobum, lobis valvatis extus dense pilosis. *Fructus* membranaceus v. subbaccatus, indehiscens, irregulariter ruptus. *Semina* minima, oblonga.—Herbæ *succo lacteo scatentes*; radice *magno, tuberoso*; caule *volubili*; foliis *alternis, oppositis, subverticillatisve*; floribus *axillaribus* v. *terminalibus.*

1. CAMPANUMŒA JAVANICA (*Blume, Bijd.* 726). **Glaberrima, scandens, foliis oppositis cordatis acutis subcrenatis subtus glaucis, sepalis basi ovarii adnatis, floribus pentameris.**—*Alph. D.C. Monog.* 119,

et in D.C. Prodr. vii. 423. Codonopsis, § Campanumœa Javanica, *Hf. & T. in Ill. Himal. Plants,* t. xvi. B.

Hab. In Himalayâ orientali temperatâ, alt. 5000–6000 ped. Sikkim! *J. D. H.* In montibus Khasia, alt. 4000–6000 ped. graminosis! *Griffith, Hf. & T.* (fl. Jul.) (v. v.)—*Distr.* Java! *Blume, Lobb.*

Caules graciles, volubiles. *Folia* 1–2 pollicaria, basi cordata v. biloba, sinu lato interdum ad insertionem petioli dilatato, acuta v. subobtusa, crenata rarius integerrima, membranacea, superne pallide viridia; petiolo ½–¾ longit. laminæ. *Flores* solitarii, ¾–1½ poll. longi, axillares, virescentes; pedicellis petiolo æquilongis longioribusve. *Calyx* in alabastro magnus, vacuus, basi florem parvum gerens. *Sepala* basi ovarii adnata, ovato-lanceolata v. ovato-oblonga v. linearia, obtusa v. acuta, magnitudine varia, plerumque ¼–⅓ longit. corollæ, post anthesim crescentia. *Corolla* supera, breviter tubuloso-campanulata, basi lata obscure 5-angulata, lobis vix patentibus late ovatis apicibus acutis papillosis. *Filamenta* lineari-subulata, glabra, basi vix dilatata. *Antheræ* lineares, connectivo apiculatæ. *Stylus* columnaris, teres, glaber, apice obconico pubescente in ramos stigmaticos late oblongos revolutos dilatatus. *Ovarium* late hemisphæricum, obscure 10-costatum, 5-loculare; loculis sepalis alternantibus. *Bacca* pulposa v. submembranacea, purpurea, calyce persistente sæpissime aucto suffulta, ½–1 un. diametro, 5-locularis, evalvis; semina placentis latis axillaribus multiseriatim affixa, oblonga, sessilia. *Testa* coriaceo-crustacea, areolis suborbiculatis minute tessellata, exemplaribus perplurimis ab omnibus patriis examinatis vacua!—Odor vix ullus, graveolens.

The flowers vary extremely in size, the calyx-lobes in proportionate size to corolla and in shape, and they further continue growing after the corolla withers. *Berry* purple or green, walls fleshy or membranous.

2. CAMPANUMŒA LANCEOLATA (*Sieb. & Zucc. Flor. Jap.* i. 174. t. 91). Caule volubili, foliis alternis v. subfasciculatis breviter petiolatis oblongo-lanceolatis utrinque attenuatis acutis integerrimis glabris subtus glaucescentibus, floribus terminalibus solitariis, calyce imo basi ovarii adnato.—Campanumœa lanceolata, *Planch. in Flore des Serres,* t. 927; "*Fl. Jap.* l. c." Tsuru ninzin, *Thunb. Fl. Jap., Plant. obscuræ,* n. 21. p. 353.

Hab. Chinâ, fide *Siebold,* in Japoniâ culta, *Siebold.*

Radix tuberosa, crassa, fere ut in *Panace quinquefolio* (unde nomen Jap. vern. Ninzin). *Caulis* 2–3 pedalis, glaber, purpurascens. *Folia* in caule alterna, in ramulis approximata, breviter petiolata, 1–2 unc. longa, integerrima v. irregulariter et remote crenulata, reticulatim venosa. *Flores* in apice ramulorum abbreviatorum in racemum brevem simplicem bracteolis parvis lanceolatis munitum dispositi, plerique abortivi, pedunculo tereti erecto. *Calyx* ovario basi adnatus, ceterum liber; tubus hemisphæricus, extus 10-sulcatus, glaber, limbus

5-partitus, laciniis ovato-lanceolatis integerrimis, corolla ¼ brevioribus. *Corolla* perigyna, magnitudine *Campanulæ Trachelii*; extus pallide lilacina, intus hepatico-violacea, glabra; limbi laciniis ovato-deltoideis acutis tenuissime papilloso-ciliatis. *Discus* 4-angularis, carnosus, glaber, olivaceus. *Stamina* 5, libera; filamentis longitudine tubi corollæ. Antheræ 4 (?)- loculares, 4 (?)- valves. *Ovarium* 3-loculare. • *Stylus* longitudine staminum, a medio apicem versus dense papillosum. *Stigma* incrassatum, infundibuliforme, 3-lobum.

The above description is abridged from Siebold and Zuccarini's beautiful work; those writers describe the root as sweet with an after bitter taste, and add, that it is considered an efficacious remedy in complaints of the chest and chronic affections of the lungs. We have queried the description of the anthers, which are said to be 4-locular, probably being a clerical error for 2-locular, as they appear to be in the plate, and in that given in the 'Flore des Serres.'

Gen. III. CODONOPSIS, *Wall.*

Calyx superus, 5-lobus. *Corolla* tubulosa v. campanulata, 4–6-loba. *Stamina* 4–6, libera; filamentis basi subdilatatis filiformibus; antheris oblongis. *Discus* epigynus carnosus, depressus, obscure lobatus. *Ovarium* costatum, globosum v. obconicum, pars superior truncata v. conica, in stylum rectum attenuatum, 3–5-loculare, loculis multiovulatis; *ovulis* multiseriatis, placentis crassis axillaribus adnatis. *Stigma* clavatum, 3–5-lobum, lobis valvatis intus planis extus dense pilosis, sub anthesim recurvis. *Fructus* pars infra corollam baccata indehiscens v. irregulariter rupta, pars superior conica coriacea v. cornea, 3–5 valvis. *Semina* oblonga, testa crustacea v. coriacea, lævia v. reticulata; albumine copioso carnoso; embryone tereti.—Herbæ *volubiles v. suberecti; succo lacteo v. aqueo, sæpissime fœtido; glaberrimæ v. pilosæ;* caulibus *simplicibus v. ramosis;* foliis *oppositis alternisve*; floribus *sæpius magnis, terminalibus, axillaribus, oppositifoliis v. extra-axillaribus, cernuis pendulisve.* Corolla *membranacea v. subherbacea, cærulea, virescens v. sordide alba, purpureo-variegata et venosa, lobis brevibus, papilloso-ciliatis.* Pollen *globosum, læve v. muricatum.* Ovarii *loculi dum numero sepalis æquales iis oppositi vel alterni; dum pauciores oppositi et alterni;* stigmatis *lobis loculis ovarii oppositis, extus et basi dense pilosis, pilis basi papillis cellulosis insidentibus;* ovulis *anatropis, integumentis cum nucleo conferruminatis.*

1. **Codonopsis viridis** (*Wall. in Roxb. Fl. Ind.* ii. 103). Volubilis, ramis glabris, ramulis foliisque præsertim subtus canis cano-tomentosisve, foliis oppositis alternisque ovatis oblongis ovato-lanceolatisve acutis acuminatisve, pedicellis axillaribus et oppositifoliis, calyce pubescente lobis augustis, ovario hemisphærico, corolla late campanulata, bacca depresso-globosa apice conica, valvis 3–5 corneis.—*Wall. Cat.* 1298; *Alph. D.C. Mon. Camp.* 120. Wahlenbergia viridis, *A.D.C. Prodr.* vii. 425. Campanula viridis, *Spreng. Cur. Port.* 78. Codonopsis 2 & 3, t. 372, *Griff. Not.* iv. 280, 281.

Hab. In sylvis temperatis Himalayæ; Nipal! *Wall.*; Kumaon, alt. 7000 ped.! *Blinkworth, Madden*; Montibus Khasia, alt. 5000–6000 ped.! graminosis, *Griffith*, &c. (fl. Sept.) (v. v.)

Fœtida. *Rami* debiles, glabri, nitidi, ramulis pubescentibus villosisve. *Folia* opposita et alterna, glabrata v. cano-pubescentia v. in exemplaribus Khasianis cano-tomentosa, petiolo gracili ½-1 pollicari, lamina latitudine varia, 2–4 unciali, membranacea, basi rotundata rarius cordata, apice acuta v. acuminata, margine integerrima v. obscure crenato-dentata. Flores magnitudine variabiles. *Calycis* tubus late hemisphæricus, *lobis* distantibus, linearibus, patentibus, integerrimis v. subdentatis. *Corolla* ½ unc. longa, late cylindraceo-campanulata, lobis brevibus, late ovatis, acutis, glaberrima v. puberula, plerumque pallide viridis, intus basi purpurascens, lobis venosis apicibus rubris. *Bacca* ½-1 unc. lata, carnosula, valvis corneis. *Semina* pallide fusca v. sordide flavida; testa reticulata.

The Khasia Mountain specimens are usually more downy than the Himalayan ones, the leaves being sometimes almost villous on both surfaces, but we find no other difference between them and the Kumaon specimens; the latter are sometimes almost glabrous.

2. **Codonopsis affinis** (*Hf. & T.*). Volubilis, ramis glabris, ramulis ultimis puberulis, foliis ovato-cordatis basi profunde bilobis superne glabris subtus cano-pubescentibus, pedunculis oppositifoliis, calycis tubo hemisphærico lobis lineari-oblongis lanceolatisve puberulis, corolla late cylindraceo-campanulata, fructu ut in *C. viridi*.

Hab. In sylvis et fruticetis temperatis Himalayæ orientalis; Sikkim vallibus Lachen et Lachung, alt. 6000–9000 ped.! *J. D. H.* (fl. Aug.) (v. v.)

C. viridi simillima, sed foliis brevius petiolatis magis coriaceis et semper basi profunde bilobo-cordatis, lobis rotundatis, sinu clauso v. aperto. *Flores* virescentes, apicibus loborum corollæ rubris. *Calycis* lobi latiores quam in *C. viridi*.

3. **Codonopsis purpurea** (*Wall. in Roxb. Fl. Ind.* ii. 105). Glaberrima, caule scandente fragili nodis incrassatis, foliis oppositis breve petiolatis lanceolatis ovatis ovato-lanceolatisve acutis basi subacutis membranaceis subtus glaucis, pedicellis terminalibus axillaribus

oppositifoliisque petiolis multoties longioribus, calycis tubo conico, lobis late ovato-lanceolatis acutis corolla late cylindracea dimidio brevioribus.—*Wall. Cat.* 1299! *Alph. D.C. l. c.* 121. Wahlenbergia purpurea, *Alph. D.C. Prodr.* vii. 425. Campanula purpurea, *Spr. Cur. Port.* 78.

Hab. In Himalayâ temperatâ centrali, Nipal! *Wallich.* Kumaon, alt. 6000 ped.! *Strachey & Winterbottom* (fl. æstate).

Herba ut videtur scandens, sed vix volubilis. *Caulis* glaberrimus, nitidus, fragilis, ad nodos incrassatus, sed vix articulatus. *Folia* 1–3 unc. longa, ½–1½ lata, membranacea, integerrima v. leviter subcrenulata, basi acuta v. subrotundata, apice acuta v. acuminata, subtus glauca; petioli ¼–⅓ unc. longi. *Pedicelli* validi suberecti, plerumque oppositifolii, rarius terminales, pollicares. *Calycis* tubus glaberrimus, late obconicus, lobis ½–⅓ unc. longis. *Corolla* purpurea, 1 unc. longa.

This species appears, from the dried specimens we have examined, and which are all rather poor, to be hardly a twiner to the same extent as the other species of this section are. The leaves are almost constantly opposite, except where one is replaced by a peduncle. The stems are very shining and brittle, the leaves membranous and flowers large. It cannot be confounded with any other.

4. **Codonopsis inflata** (*Hf. & T. Ill. of Him. Plants*, t. xvi. c.). Glaberrima, volubilis, foliis alternis ovatis triangulari-ovatisve acuminatis basi late v. profunde cordato-bilobis sinu lato v. angusto, pedunculis oppositifoliis v. supra-axillaribus, calycis tubo obconico angulato lobis late ovato-oblongis acutis, corolla ventricoso-cylindracea ampullacea infra lobos breves contracta, bacca carnosa angulata sulcata apice 3-valvi, valvis brevibus corneis.

Hab. In sylvis et fruticetis Himalayæ temperatæ orientalis. Sikkim, montibus exterioribus alt. 5000–6000 ped.! (fl. Aug.) (v. v.)

Caules 8–10 pedales, ramosi, glaberrimi, novelli puberuli. *Petioli* graciles, 1–1½ pollicares. *Folia* majuscula, 2–4 uncialia, exacte ovato-cordata v. triangulari-ovata, acuminata, integerrima v. rarius crenulata, subtus glaucescentia, basi late v. profunde cordata, lobis rotundatis patentibus conniventibus. *Pedunculi* interdum cum caule longe connati hinc supra-axillares v. oppositifolii, petiolis subæquilongi. *Flores* magni, pallide sordide flavi, purpureo-venosi, et interdum rubro pallide suffusi. *Calycis* tubus 8–10 sulcatus et angulatus, lobis latis foliaceis patentibus. *Corolla* pollicaris. *Bacca* purpurea, glauca, carnosa, sulcata et angulata, late oblongo-obconica v. subcylindracea, truncata, apice breviter 3-valvi, valvis parvis corneis; interdum ut videtur omnino carnosa et indehiscens, magnitudine et forma variabilis, ½–1¼ unc. longa. *Semina* oblonga; testa sordide fulva, reticulata.

5. CODONOPSIS ROTUNDIFOLIA (*Benth. in Royle, Ill. Bot. Him.* 254. t. 62). Caule volubili piloso, foliis gracile petiolatis ovatis rotundatisve obtusis v. acutis basi rotundatis cordatisve grosse crenatis, pedunculis oppositifoliis petiolis longioribus interdum subterminalibus, calycis tubo angulato et sulcato lobis magnis foliaceis, corolla late campanulata breviter 5-loba, bacca carnosa apice valvis 3 corneis conicis dehiscente.—*Hook. in Bot. Mag.* t. 4942. C. lurida, *Lindley*. Wahlenbergia rotundifolia, *Alph. D.C. Prodr.* vii. 425.

Hab. In sylvis et fruticetis Himalayæ temperatæ occidentalis; Kumaon! *Royle*; alt. 10,000 ped.! *Strachey & Winterbottom*; Kulu! 6000–7000 ped.! *Edgeworth*; Kishtwar, 8000 ped.! *T. T.* (v. v.)

Caulis patentim pilosus v. glabratus, nitidus. *Folia* opposita et alterna, 2–4 unc. longa, membranacea, glaberrima v. parce pilosa. *Pedunculi* plerumque oppositifolii, rarius ob ramulum lateralem abbreviatum quasi terminales, petiolis plerumque longiores, validi. *Flores* majusculi, ⅔–1 unc. longi. *Calycis* tubus basi rotundatus; lobis amplis, membranaceis, obtusis v. acutis, crenatis integerrimisve, corolla paulo brevioribus. *Corolla* sordide cærulescens v. virescenti-albida, colore varia, late cylindraceo-campanulata. *Bacca* ut in congeneribus forma et diametro varia, sulcata, subcylindraceo-obconica v. subglobosa, purpurea, carnosa, apice valvis 3 corneis longitudine variis dehiscens. *Semina* sordide flava, testa reticulata.

The broad foliaceous calyx-lobes at once distinguish this species from any except *C. Benthami*. The peduncles never seem to be terminal in the same sense as they are in the following section, but are generally manifestly opposite the leaves, or attached to the stem below them; that of the upper flower is however so much stouter than the branch beyond it, as to approach in appearance a terminal inflorescence. Royle's cultivated specimens seem to be quite glabrous, and Strachey and Winterbottom's are almost so too. Thomson's and Edgeworth's are more pilose. The fruit is extremely variable in size and form. The specific name is a bad one, some specimens bearing ovate leaves on the same individual with the rounded ones, and in others they are all ovate-cordate. The species is cultivated at Kew, both in the open air and in a cool greenhouse; in the latter the plants are always paler and more membranous, with broader leaves and larger flowers.

6. CODONOPSIS BENTHAMI (*Hf. & T.*). Caule volubili ramoso rarius puberulo, foliis (rarius suboppositis) petiolatis ovatis ovato-lanceolatisve acutis grosse obtuse serratis basi acuminatis rotundatisve parce pubescentibus glabratisve subtus pallidioribus, pedunculis terminalibus, calycis tubo 5-costato lobis ovatis lanceolatisve acuminatis ciliatis

subserratis, corollæ cylindraceæ limbo erecto breviter 5-lobo, bacca carnosa apice valvis 3 dehiscente.

Hab. In sylvis et fruticetis Himalayæ orientalis temperatæ, Sikkim, alt. 9000–11,000 ped.! (fl. Jul.) (v. v.)

C. rotundifoliæ proxima; differt caule robustiore, foliis majoribus et angustioribus acuminatis nunquam patentim pilosis, floribus terminalibus, corolla tubulosa longiore et angustiore.

We were for some time inclined to consider this as an Eastern form of the Western *C. rotundifolia*, but cannot venture to unite them. The plant has a very heavy, rank, almost hircine smell when fresh.

7. CODONOPSIS OVATA (*Benth. in Royle, Ill. Bot. Him.* 253. t. 69. f. 3). Caule ramoso ascendente pubescenti-piloso pilis reflexis, foliis breve (v. longius) petiolatis ovatis ovato-cordatis lanceolatisve pubescentibus inferioribus et ramorum sterilium oppositis, pedunculo terminali valido erecto 1–3-floro superne nudo v. parce foliato, calycis tubo obconico-hemisphærico, lobis ovatis acutis pilosis corolla ampla cylindracea apice 5-loba ⅓–¼ brevioribus, stigmate dilatato, capsula utrinque conica basi coriacea apice valvis 3 elongatis corneis.—*Lindl. in Gard. Chron.* 1856, p. 468. cum xylog. Wahlenbergia Roylei, *A. D.C. Prodr.* vii. 425. W. clematidea, *Schrenk. En. Pl. Soong.* v. 38.

Var. *β. ramosissima,* foliis flaccidis gracile petiolatis.

Hab. In sylvis et fruticetis Himalayæ boreali-occidentalis temperatæ, Kashmir! Herb. *Royle.* In Tibetiâ occidentali, Ladak! et Piti! alt. 9000–11,000 ped., *T. T.*; Afghanistan! *Griffith,* var. *β.* Baltal, Kashmir, alt. 9500 ped.! *T.T.* (fl. August.) (v. v.)—*Distr.* Soongaria!

Species annua?, fœtida, odore hircino, variabilis, 1–3-pedalis, e basi ramosa. *Caules* ascendentes, sæpe ramulosi, in pedunculos validos erectos apice curvos desinentes, ramulis plerumque non florentibus foliis minoribus oppositis alternisve onustis: pubes omnibus partibus brevis, densus v. laxus, pilis patulis vel sæpius deflexis immixtus. *Folia* subsessilia v. petiolata ½–1½ unc. longa, plerumque ⅓–⅔ pollicaria, acuta, integerrima, submembranacea, basi rotundata v. cordata v. acuta; in exemplaribus Tibeticis minora, densius pubescentia; in locis humidioribus membranacea majora. *Pedunculi* 1–3-flori. *Flores* cernui v. nutantes, ampli, pallide cærulei, ⅔–1¼ unc. longi. *Corolla* breviter 5-loba. *Stigma* amplum, dilatatum, cupulæforme, 3-lobum, lobis erectis, extus densissime villosum. *Capsula* ¾ unc. longa, erecta, basi brevi-obconica, valvis 3 elongatis corneis. *Semina* lineari-oblonga, testa nitida flavo-brunnea.

The Kashmir specimens are much larger, more flaccid, branched, and have more slender petioles than the Tibetan ones: these differences are without doubt due to climate. Griffith's specimens have some of the leaves narrower than any of the Himalayan or Tibetan ones.

8. CODONOPSIS SUBSIMPLEX (*Hf. & T.*). Parce pilosa v. subpubescens, caule ascendente simplici v. e basi ramoso parce foliato, foliis petiolatis ovatis lanceolatis cordatisve crenatis, subtus glaucis, pedunculis terminalibus gracilibus 1–3 floris, pedicellis nudis v. 1–2-foliatis, calycis tubo hemisphærico lobis majusculis ovato-lanceolatis acuminatis corollam brevem late cylindraceam 5-lobam æquantibus, capsula breviter depresso-obconica, apice breviter 3-valvi.

Hab. In vallibus interioribus Himalayæ orientalis temperatæ. Sikkim, alt. 12,000–13,000 ped.! (fl. Jul.), (v. v.)

Herba glabriuscula, 1–2-pedalis; *caules* basi ramulos breves foliaceos emittentes, deinde ascendentes graciles simplices, in axillis foliorum ramulos abbreviatos bifoliatos gerentes. *Folia* sparsa, alterna, membranacea, ½–2 unc. longa, grosse inæqualiter crenata, acuta, acuminata v. obtusa, petiolo gracili ¼–¾ unc. longo. *Pedunculus* seu caulis apex simplex v. bis terve divisus. *Flores* nutantes v. cernui, pallide sordide cærulei, ¾ unc. longi, æquilaterales. *Calycis* lobi integerrimi v. subcrenati.

This is a much less branched plant than *C. ovata*, almost glabrous, with fewer, more membranous, larger, crenate leaves, much shorter flowers with larger (relatively) calyx-lobes, almost as long as the corolla, and a very broad depressed capsule with short horny valves. We have not, however, seen perfectly mature fruit.

9. CODONOPSIS THALICTRIFOLIA (*Wall. in Roxb. Flor. Ind.* xi. 106). Pubescens, caule ascendente basi ramulos plurimos breves foliosos graciles emittente superne in pedunculum longe nudum 1–2-florum desinente, foliis parvis oppositis alternisque pubescentibus petiolatis ovatis late cordatisve acutis obtusisve integerrimis v. obscure crenatis, calycis tubo late hemisphærico v. obconico lobis oblongis obtusis, corolla tubulosa cylindracea breviter 5-loba calyce 3-plo longiore, antheris mucronulatis extus villosis, stigmate dilatato, capsula basi late hemisphærica valvis 3 elongatis corneis.—*Benth. in Royl. Ill. Plant. Himal.* 253. Glossocomia thalictrifolia, *Wall. Cat.* 1297. G. tenera, *Don, Prodr. Fl. Nep.* 158. Wahlenbergia thalictrifolia, *Alph. D.C. Prodr.* vii. 425; Campanula thalictrifolia, *Spreng. Cur. Post.* 77.

Hab. In regione alpinâ Himalayæ centralis, Nipal! *Wallich.*

Herba ut videtur annua, spithamæa v. pedalis. *Caulis* ascendens, fructiferus robustus. *Rami* tenelli, breviusculi, foliosi. *Folia* ⅙–⅓ unc. longa, parce v. dense pubescentia. *Pedunculus* (seu apex caulis) longe nudus, 1–3-florus. *Flores* pro ratione plantæ magni, 1–1⅓ pollicares, pallide sordide cærulei. *Calycis* lobi ¼–⅓ unc. longi, acuti v. obtusi, interdum dentati. *Corolla* latitudine varia, ⅔ unc. diametr. *Fructus* ½ unc. longus. *Semina* ut in *C. ovata* et *subsimplici*.

10. CODONOPSIS FŒTENS (*Hf. & T.*). Pubescens, caule ascendente brevi e basi ramoso superne in pedunculum longe nudum 1–2-florum desinente, foliis parvis oppositis alternisque petiolatis pubescentibus

ovatis v. late cordatis integerrimis v. subcrenatis, calycis tubo late hemisphærico, lobis oblongis, corolla late campanulata, antheris glabris, capsula valvis 3 elongatis corneis :—an var. *C. thalictrifoliæ?*

Hab. In regione alpinâ Himalayæ orientalis, Sikkim, alt. 14,000–16,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

C. thalictrifoliæ proxima, et forsan ejus forma, sed exemplaribus nostris numerosissimis, corolla multoties latior fere longitudini æquilateralis, profundius lobata, magis coriacea.

Gen. IV. LEPTOCODON.

Calycis tubus medio ovarii adhærens, lobis 5 patentibus. *Corolla* tubuloso-campanulata, breviter 5-loba. *Stamina* 5, glandulis totidem epigynis erectis alternantia. *Ovarium* 3-loculare, ovulis placentis septis ovarii adnatis uniseriatim affixis. *Stylus* erectus. *Stigma* clavatum, 3-lobum. *Fructus* pars infra calycis lobos coriacea, obconica; pars superior elongato-conica, cornea, 3-valvis. *Semina* pauca, lineari-oblonga, testa atra, nitida, crustacea.—Herba *lactescens, tenerrima, volubilis, ramosa;* ramis *ramulisque fragillimis, gracilibus, dense intertextis;* foliis *oppositis alternisque, petiolatis, flaccidis, grosse crenato-lobatis;* pedicellis *gracillimis, plerumque extra-alaribus;* floribus *pendulis, dilute cæruleis;* calycis *lobis obovatis subdentatis.*

1. Leptocodon gracilis, *Hf. & T.* (Codonopsis, § Leptocodon gracilis, *nob. in Ill. Sikkim Himal. Plants,* t. xvi. A.)

Hab. In sylvis temperatis humidis Himalayæ orientalis, Sikkim! et Nepal Orient.! alt. 5000–7000 ped., *J. D. H.* (fl. Maio). (v. v.)

Planta pulcherrima, flaccida, cito evanescens, fœtidissima. *Caules* ramique dense intertexti. *Folia* $\frac{2}{3}$–1 unc. longa, petiolo fere æquilongo, pallide viridia, subtus glauca. *Calyx* semisuperus, lobis basi remotis, parvis, patentibus, corolla pluries brevioribus. *Corolla* pollicaris, translucida, tubulosa, supra medium ampliata, limbo truncato obscure 5-lobo. *Ovarii* pars infera obscure 5-costata; pars superior paulo longior in stylum attenuata. *Stigma* late ovoideum; lobis extus dense pilosis. *Glandulæ* epigynæ lineares, carnosæ. *Pollen* globosum, muricatum. *Semina* nitida; *testa* crassiuscula, albumine copioso; *embryone* tereti, *cotyledonibus* parvis, *radicula* cylindracea.

Gen. V. CYCLOCODON, *Griff.*

Calyx basi ovario adhærens v. omnino liber et pedicello positus, 5-partitus, foliolis subserratis. *Corolla* breviter campanulata, 4–5-loba. *Stamina* 4–5. *Stylus* erectus. *Stigma* clavatum, 4–5-lobum, lobis demum revolutis. *Ovarium* 4–5-loculare, loculis sepalis oppositis, ovulis plurimis, placentis crassis axillaribus multiseriatim affixis. *Fructus* baccatus, irregulariter ruptus; semina numerosa, subangulata, compressa; testa lævi coriacea; embryone late clavato, cotyledonibus radiculaque brevibus. Herbæ *tropicæ, glaberrimæ, annuæ, inodoræ, succo aqueo; caules cylindracei, di-trichotome ramosi*; ramis foliisque *oppositis*; floribus *in cymas trichotomas dispositis, parvis, albis; pedunculis curvis, cernuis.*

1. CYCLOCODON PARVIFLORUM (*Hf. & T.*). Erectum, dichotome ramosum, foliis ovato-lanceolatis longe acuminatis serratis breve petiolatis subtus glaucis, sepalis liberis, floribus tetrameris.—C. distans, *Griff. MSS. Notul.* iii. Codonopsis parviflora, *Wall. Cat.* 1300; *Alph. D.C. Mon. Camp.* 123; *A. D.C. Prodr.* vii. 423. Campanumœa celebica, *Blume, Bijdr.* 727; *Alph. D.C. Monog. et in D.C. Prodr. l. c.*

Hab. In Himalayâ orientali tropicâ alt. 3000–5000 ped. Sikkim! Assam! et Mont. Khasia, alt. 2000–4000 ped.! *Wallich, Griffith, & Hf. & T.* (fl. August. Sept.). (v. v.)—*Distr.* Ins. Celebes! Java!

Herba inodora, glaberrima, gracilis, glaucescens, 1–3-pedalis, e basi v. superne ramosa. *Caules* teretes ramique stricti. *Folia* patentia, $1\frac{1}{2}$–4 poll. longa, anguste v. late ovato-lanceolata, grosse obtuse irregulariter serrata. *Pedicelli* simplices v. divisi, validi, apice curvi, nudi v. paucifoliati. *Flores* albi, $\frac{1}{3}$ unc. longi, nutantes. *Calyx* nunc basi floris adnatus, sæpius a flore remotus involucriformis. *Sepala* linearia, lanceolata v. subulata, integerrima v. grosse multi- v. paucidentata, $\frac{1}{3}$–$\frac{1}{2}$ poll. longa, alabastrum non cælantia. *Ovarium* pyriforme, stipitatum. *Corolla* late cylindraceo-campanulata, infra medium 4-fida, lobis latis acutis. *Filamenta* dilatata, antheris linearibus æquilonga. *Stylus* superne infundibuliformis, glaber, in ramos stigmatosos 4 patentes fissus. *Bacca* globosa, vix carnosa, $\frac{1}{4}$–$\frac{1}{2}$ poll. lata, basi calyce stipata, 4-locularis. *Semina* in placentis latis axillaribus multiseriata, parva, compressa, subangulata, testa lævi coriacea; *albumen* carnoso-granulatum; embryo parvus, late clavatus, utrinque obtusus, cotyledonibus radiculaque brevibus.

2. CYCLOCODON TRUNCATUM (*Hf. & T.*). Erectum, dichotome ramosum, foliis ovato-lanceolatis acutis grosse obtuse serratis, floribus 5-meris, sepalis medio ovarii adnatis.—Codonopsis truncata, *Wall. Cat.* 130; *Alph. D.C. Monog.* 122.

Hab. Pegu ad ripas Irawaddi, *Wallich*! Mergui! *Griffith.*

C. parvifloro simillima sed major, robustior, floribus pentameris et calyce ovario adhærente, a pedunculo remoto.

Gen. VI. CYANANTHUS, *Wall.*

Calyx basi ovarii adhærens, 5-fidus, persistens, lobis valvatis. *Corolla* cylindracea, membranacea, marcescens, infundibuliformis v. subcampanulata, tubo calyce longiore, lobis 5 valvatis. *Stamina* 5, una cum corolla basi ovarii adhærentia, filamentis gracilibus, antheris oblongis liberis?. *Ovarium* imo basi calycis adhærens, ceterum liberum, conicum, tubo calycis æquilongum, in stylum corollæ tubo breviorem attenuatum. *Stigma* obconicum v. clavatum, extus pubescens, 3–5-lobum, lobis brevibus erectis demum recurvis. *Ovarium* 3–5-loculare, loculis basi placentiferis; ovulis plurimis placentis axillaribus adnatis. *Capsula* conica, coriacea, calyce emarcido interdum inflato tecta, apice 3–5 valvis. *Semina* plurima, parva, oblonga; testa fusca v. brunnea.

Herbæ Himalayanæ, *succo aqueo (in omnibus?), annuæ v. rhizomate multicipiti brevi perenni, pubescentes v. glabratæ*; rhizomatis rami *apice squamosi, squamis imbricatis*; caulibus *e ramis rhizomatis plurimis, prostratis, simplicibus, rarius divisis, speciebus annuis ramosis;* foliis *parvis, alternis, brevi-petiolatis, simplicibus v. lobatis, integerrimis et crenatis serratisve, subtus pallidis glaucisve, summis sæpissime florem involucrantibus; floribus plerisque speciosis, cæruleis, terminalibus, solitariis, sessilibus v. breve pedunculatis.*

§ I. *Radix* perennis, caulibus simplicibus. *Corolla* ampla, limbo patente.

1. **CYANATHUS INTEGER** (*Wall. Cat.* 1472). **Caule simpliciusculo elongato glabro, foliis elliptico- v. obovato-lanceolatis acutis supra medium serratis utrinque appresse pilosis, floribus terminalibus breve pedunculatis, calyce cylindraceo atro-villoso corollæ tubo ½ breviore.—*Benth. in Royle, Ill. Pl. Him.* 309; *Walp. Rep.* vi. 388. C. barbatus, *Edgw. in Linn. Trans.* xx. 82.**

Hab. In Himalayæ regione temperatâ et subalpinâ, alt. 10,000–12,000 ped. Kumaon! *Blinkworth, Strachey & Winterbottom.* (fl. Jul.)

Caules spithamæi ad pedales, graciles, prostrati apicibus ascendentibus, apicem versus puberuli, cæterum glaberrimi nitidi. *Folia* brevissime petiolata, ½–⅔ unc. longa, subtus glauca, membranacea. *Flores* speciosi, erecti. *Calyx* ½ unc. longus, basi rotundatus, lobis ovato-lanceolatis acutis tubo æquilongis. *Corolla* pallide cærulea, anguste campanulata, glaberrima, lobis brevibus late ovatis vix acutis, glabris. *Stamina* tubo corollæ ½ breviore, filamentis gracillimis; antheris oblongis. *Ovarii* pars superior elongato-conica, staminibus æquilongis, in stylum brevem angustata; stigmate capitato 5-lobo.

2. **CYANANTHUS LOBATUS** (*Wall. Cat.* 1473). **Caule simpliciusculo elongato, foliis cuneatis spathutalisve profunde inciso-lobatis crenatisve trilobisve segmentis obtusis cuneatis, subtus parce pilosis, floribus terminalibus breve pedunculatis, calyce cylindraceo atro-villoso corollæ late infundibuliformis tubo dimidio breviore, corollæ lobis late obovatis patentibus apice barbatis v. glaberrimis.—*Benth. in Royle, Ill.* 309; *Walp. Rep.* vi. 388.**

***Hab.* In Himalayæ regione alpinâ, alt. 11,000–13,000 ped. Nepal!**

Wallich. Kumaon! *Blinkworth, Edgeworth, Strachey & Winterbottom, Madden.* Sikkim! *J. D. H.* (fl. Aug.) (v. v.)

Caules subrobusti, spithamæi et ultra, plerumque plus minusve patentim pilosi, prostrati apicibus ascendentibus. *Folia* sparsa, $\frac{3}{4}$–1 unc. longa, latitudine varia, basi cuneata in petiolum latum angustata, 3-multiloba, subtus glauca, marginibus sæpius sicco recurva, subtus sæpissime pilosa, rarius utrinque pilosa v. utrinque glabra. *Flores* inclinati, speciosi, eos *C. integri* æquantes, sed limbo longiore latiore et magis expanso. *Pedunculus* atro-villosus. *Calyx* longitudine varius, nunc paulo longior nunc bis longior quam latus, lobis acutis $\frac{1}{3}$ longitudine tubi. *Corollæ* limbus explanatus, laciniis apice glabris pilisve raris barbatis; tubus glaberrimus. *Stamina* et *ovarium* ut in *C. integro*; stigmate subclavato 4-lobo. *Capsula* calycis tubo æquilonga, apice breviter 4-5-valvis. *Semina* lineari-oblonga, testa fusca.

3. CYANANTHUS LINIFOLIUS (*Wall.*). Caulibus e rhizomate crasso plurimis ascendentibus foliisque pubescenti-pilosis glabratisve, foliis brevibus lineari-oblongis subacutis obscure crenato-serratis marginibus recurvis, floribus terminalibus breve v. longe pedunculatis, calyce cylindraceo atro-villoso corollæ tubo $\frac{1}{2}$–$\frac{2}{3}$ breviore lobis lanceolatis acutis, corolla infundibuliformi-campanulata fauce villosa lobis apice acutis pilosulis rarius glaberrimis.—C. microphyllus! *Edgw. in Linn. Trans.* xx. 81.

Hab. In Himalayæ regione alpinâ, alt. 10,000–16,000 ped.! *Wall.*; Kumaon! *Edgeworth, Strachey & Winterbottom*; Sikkim! *J. D. H.* (fl. Aug. Sept.) (v. v.)

Rhizoma breve, crassum, multiceps, perenne. *Caules* perplurimi, graciles, prostrati demum ascendentes, 4 unc. ad spithamæum, basi squamis brevibus ovato-lanceolatis nitidis $\frac{1}{4}$ unc. longis imbricatis circumdati. *Folia* $\frac{1}{4}$–$\frac{2}{3}$ unc. longa, subtus glauca, plerumque utrinque pubescentia, rarius glabra. *Flores* speciosi, *C. integro* similes sed calyce plerumque breviore lobisque corollæ paulo longioribus. *Calycis* lobi ovato-lanceolati. *Corolla* pollicaris, fauce tuboque dense v. laxe villoso v. glaberrimo, lobis apice laxe ciliatis nudisve. *Ovaria* et stamina exacte cum *C. integro* quadrant; *stigmate* subclavato 4-5-lobo, lobis recurvis. *Capsula* calyce æquilonga, 4–5-valvis. *Semina* parva, oblonga, brunnea.

4. CYANANTHUS INCANUS (*Hf. & T.*). Caulibus e rhizomate crasso plurimis brevibus ascendentibus foliisque utrinque dense incano tomentosis, foliis brevibus ovatis ellipticis lanceolatisve marginibus obscure sinuato-crenatis recurvis, floribus terminalibus, calyce breviter cylindraceo incano v. fusco-tomentoso lobis brevibus, corolla calyce triplo longiore lobis oblongis fauce dense villosa.

Hab. In Himalayæ orientalis regione alpinâ, Sikkim, alt. 12,000–16,000 ped.! *J. D. H.* (fl. July, Aug.) (v. v.)

C. linifolio affinis sed minor, caulibus interdum ramosis foliisque dense tomentosis. *Rhizoma* crassum, multiceps. *Caules* basi squamis cincti, pilis patulis. *Folia* forma varia, subconferta, ¼ unc. longa. *Flores* sessiles v. pedunculati, suberecti, vix pollicares. *Calyx* breviusculus, pallidus, pilis subappressis, fructiferus paulo inflatus. *Ovarium* calyci æquilongum; stylo longiore quam in præcedentibus; stigmate *C. linifolii*. *Capsula* conica, calyci basi turgido æquilonga. *Semina* minima, oblonga, fusca.

§ II. *Annuæ*, caulibus ramosis. *Corolla* cylindracea, limbo non patente.

5. CYANANTHUS INFLATUS (*Hf. & T.*). Annuus, caulibus prostratis filiformibus ramosis patentim pilosis, foliis sparsis petiolatis rotundatis sinuato-dentatis crenatisve supremis subinvolucrantibus, calyce obovato breviter 5-dentato patentim fusco-villoso, corolla cylindracea brevissime 5-loba, capsulæ valvis ultra calycem inflatum globosum porrectis.

Hab. In Himalayæ orientalis regione alpinâ, alt. 11,000–16,000 ped. Bhotan! *Griffith* (1771); Sikkim! et Nepaliâ! orientalis, *J. D. H.* (fl. August.) (v. v.)

Herba statura variabilis, 2 unc. ad bipedalem! *Caules* prostrati, divaricatim ramosi, flexuosi, rigidi, ramosi, parce foliati. *Folia* sparsa, parva, ¼ unc. longa, 2 summa flori approximata. *Flores* suberecti, ⅓–½ unc. longi, cærulei, sessiles v. pedunculati. *Calyx* basi turgidus, corollæ dimidio brevior; fructifer ¼–⅔ unc. diametro. *Corollæ* lobi brevissimi, erecti. *Ovarium* calyce longius; stylo brevi; stigmate obconico 5-lobo. *Capsula* late conica, valvis 5 exsertis recurvis acuminatis. *Semina* minima, oblonga, fusca.

6. CYANANTHUS (*sp. nov.* sed exemplaria manca). Annua, *Cerastoidea*, caulibus rigidius ramosis multifloris 2–4-pollicaribus, foliis parvis petiolatis ovatis, calycibus fructiferis parvis oblongis longe laxe villosis breviter 5-dentatis, capsulæ valvis 3–5 erectis subexsertis.

Hab. In Himalayæ regione alpinâ Nepaliæ orientalis, alt. 13,000 ped.! *J. D. H.* (v. fr. v.)

Gen. VII. WAHLENBERGIA.

1. WAHLENBERGIA AGRESTIS, *A. D.C.* (*Wight, Icon.* t. 1175). W. dehiscens, *A. D.C.* W. Indica, *A. D.C.* (*Wight, Icon.* t. 1176). Confer quoque W. gracilis, *A. D.C.*, ex Australia; W. quadrifida, *A. D.C.*, ex Australia; W. multicaulis, *A. D.C.*, ex Australia; W. Sieberi, *A. D.C.*, ex Australia; W. marginata, *A. D.C.*, ex Japan; W. lavandulæfolia, *A. D.C.*, ex Java; W. silenoides, *Hochst.*, ex Abyssinia. Species pleræque variabiles, valde affines, et si vere distinctæ vix characteribus propositis certe distinguendæ.

Hab. Per totam Indiam orientalem tropicam et subtropicam, arvis, locis sterilibus pinguibusque vulgatissima, a Ceyloniâ! ad Garwhal! (fl. per totum annum) (v. v.).—*Distr.* Chinâ, Africâ orientali? et australi?, et in Australiâ?

2. *Wahlenbergia peduncularis*, A. D.C. (sub *Campanula peduncularis*, Wall. in Prodr. viii. 483).

Hab. In Himalayæ orientalis provincia Kumaon! alt. 6000–7000 ped. *Blinkworth, Strachey & Winterbottom*, &c. (fl. temp. calid.).

Vera *Wahlenbergia* est ut rite conjicitur cl. A. DeCandolle. *Corolla* fere ad basin 5-loba; lobis vix æqualibus. *Capsulæ* pars superior conica, 3-valvis. *Stigmata* 3, revoluta. *Stamina* libera. *Anthera* lineari-oblonga, filamento infra medium dilatato ciliato ½ brevior.

Gen. VIII. CAMPANULA, *L.*

1. **CAMPANULA** (§ Medium) **GRIFFITHII** (*Hf. & T.*). Hispido-pilosa, caulibus e radice crassa plurimis suberectis dichotomis subramosis rigidis pallidis nitidis, foliis (⅓ pollicaribus) subsessilibus oblongo-lanceolatis dentatis utrinque hispido-pilosis, floribus subpaniculatis breve pedunculatis, calycis strigoso-hispidi tubo brevi lobis oblongo-ovatis sinubus breviter deflexis, corolla late campanulata pilosa, stylo elongato exserto, stigmatibus 2–3, capsula fere supera.

Hab. Affghanistan! *Griffith*, 695; Beloochistan! fissuris rupium frequens, *Stocks*, 954.

Radix lignosus. *Caules* perplurimi, 6 unc. ad spitham., suberecti, teretiusculi, pilis reflexis sparse hispidi, uti tota planta pallidi, fragiles. *Folia* grisea, argute dentata v. subintegerrima, ciliata, superne strigosa. *Flores* nutantes sub ½ unc. longi. *Calycis* appendices longitudine variæ lobis corollæ ½ breviores, ciliatæ. *Corolla* basi inflata, lobis ovato-lanceolatis. *Stylus* corolla duplo longior. *Capsulæ* pars infra limbum calycis hispida, brevis, late turbinata; pars superior corolla persistente tecta, subhemisphærica. *Semina* minima, lineari-oblonga, pallide brunnea.

2. *Campanula latifolia*, L.

Hab. In Himalayâ centrali et occidentali temperatâ, alt. 7000–11,000 ped. Nepal! *Wallich*; Kumaon! *Blinkworth*, &c.; Simla, *Edgeworth*, &c.; Kashmir! (fl. Aug.) (v. v.)—*Distr.* Europa borealis et australis; in montibus Caucasi et Persiæ borealis.

3. *Campanula sylvatica*, Wall.

Hab. Regione temperatâ Himalayæ, alt. 5000–9000 ped. Bhotan! *Griffith*; Nepal! *Wallich*; Kumaon! *Strachey & Winterbottom*, &c. (fl. temp. calid.) (v. v.)

4. **CAMPANULA** (**EUCODON**) **CANA**, *Wall.* Tota dense cano-tomentosa, caulibus diffusis ramosis rarius teretibus subflexuosis, foliis (½–¾ poll.) subsessilibus ellipticis ovato-lanceolatisve subacutis utrinque albidis subtus obscure venosis crenatis integerrimisve, floribus (magnis) ad apices ramulorum paucis nutantibus, calycis cani tubo brevissimo lobis triangulari-ovatis integerrimis acuminatis corolla ter brevioribus, corollæ campanulatæ pubescentis lobis brevibus, stylo gracili, stigmatibus 3 brevibus inclusis.

Var. α. Caule ramisque villosis pilis sericeis subpatulis, foliis crenatis.

Var. β. Caule ramisque tomentosis robustis, foliis crenatis.

Hab. Montibus temperatis Himalayæ: var. α. Nepal! *Wallich*; Kumaon! *Strachey & Winterbottom*; Garwhal, 6000 ped.! *Edgeworth*; Simla, alt. 7000–8000 ped.! *T. Thomson.* (fl. Aug.) (v. v.)

Var. β. Bhotan! *Griff.* 2208. (fl. Sept. Oct.) (v. v.)

Species pulcherrima, *C. coloratæ*, var. γ, affinis, ubique pube nivea plus minusve tomentosa v. villosa vestita, floribusque magnis cæruleis conspicua. *Caules* 4–6 unc. longi, parce divaricatim ramosi, teretes, sicco subfragiles. *Folia* sparsa, rarius conferta, patula, plana v. rarius marginibus recurvis, $\frac{1}{3}$–$\frac{2}{3}$ unc. longa, obtusa, venis subtus crassis prominentibus. *Flores* breve pedicellati, pedicellis curvis. *Corolla* exemplaribus Kashmiricis fere pollicaris, pubescenti-pilosa. *Filamenta* basi latissima fimbriata, superne filiformia. *Ovarium* fere superum; pars superior late hemisphærica in styli basin abrupte attenuata, glaberrima. *Capsula* breviter obconica, valvis basilaribus.

5. *Campanula canescens*, Wall.

Hab. Affghanistan, *Griffith.* Planitie Panjab! Bengaliæ superioris! et orientalis! necnon convallibus tropicis Khasiæ! et Himalayæ! ad 6000 ped. ascendens, arvis et ruderatis vulgaris. (fl. per totum annum.) (v. v.)

Flores dimorphi, alii normales, alii minimi corolla et staminibus destituti.

6. *Campanula colorata*, Wall. — cf. *C. pallida*, Wall.; sequentes varietates habendas nobis videtur.

β. *Moorcroftiana*, calycis lobis angustis.

γ. *ramulosa*, calycis lobis subdentatis. *C. ramulosa*, Wall., Wight, Icon. 1178. *C. nervosa*, Royle! Ill. 253, sine descr.

δ. *Tibetica*; minor, collo multicipiti, ramis scaberulo-pubescentibus diffusis 3–6-pollicaribus, foliis elliptico-ovatis subdentatis, lobis calycinis late triangularibus; floribus sæpius dimorphis.

ε. *anomala*; calycis lobis sinubus subreflexis, cæterum δ. *Tibeticæ.*

Hab. In Himalayâ temperatâ, alt. 5000–6000 ped. (fl. æstate.)

var. α. Nepal! *Wallich*; Kumaon! *Strachey & Winterbottom*, &c.; Simla! *Edgeworth*, &c.; Kashmir! (v. v.)

var. β. Kumaon! Simla! Kunawur! Kashmir! Tibetiâ occidentali! et Affghanistan! *Griffith.* (v. v.)

var. γ. Montibus Khasia 5000–6000 ped.!, *Lobb*, &c.; Nilghiri! *Wight*, &c.; Sikkim, alt. 6000–10,000 ped.! Nepal, *Wallich*; Kumaon! *Strachey & Winterbottom.* (v. v.)

var. δ. In Tibetiâ occidentali Zanskar!, Kashmir!, &c., alt. 8000–12,000 ped. (v. v.)

var. ε. In Tibetiæ occidentalis regione temperatâ; Nubra, alt. 12,000 ped.! *T. T.* (fl. Aug.) (v. v.)

7. *Campanula Alphonsii*, Wall. Wight, Spicil. ii. 22. t. 125. Icon. 1177. —an forma *C. canæ*, Wall.?
Hab. Montibus Nilghiri regione temperatâ, alt. 7000–8000 ped.! *Wight*, &c. (fl. æstate.)

8. *Campanula Kashmiriana*, Royle.
var. *β. evolvulacea* (Royle), minor, caulibus laxioribus tenuioribus diffusis, floribus minoribus.
Hab. In Himalayæ et Tibetiæ occidentalis regione temperatâ, alt. 6000–13,000 ped.; Garwhal! *Strachey & Winterbottom*, &c.; Kunawur! Kishtwar! Kashmir! &c. (fl. æstate.) (v. v.)
Planta polymorpha, floribus dimorphis, aliis speciosis iis *C. coloratæ* subsimilibus (iconi Roylei congruentibus), aliis axillaribus longe gracile pedunculatis minimis, corolla et staminibus orbatis. *Flores* erecti v. nutantes. *Calycis* laciniæ interdum sinubus basi subreflexis ut in § *Medium.*

9. CAMPANULA ALSINOIDES (*Hf. & T.*). An forma apetala *C. coloratæ* var. *Tibeticæ*? patentim pubescenti-pilosa, ramis gracillimis prostratis filiformibus ramosis, foliis membranaceis oblongo-ovatis in petiolum angustatis subacutis obscure dentatis, pedicellis terminalibus axillaribusque elongatis filiformibus, calycis tubo globoso laciniis lanceolatis irregularibus integerrimis dentatisve.
Hab. In Himalayæ occidentalis provinciis Kunawur superiore!; Kishtwar! et in Tibetiâ occidentali! alt. 7000–10,000 ped. (fl. æstate.) (v. v.)
Radix perennis, lignosa. Rami v. caules perplurimi, uti tota planta pilis brevibus patentibus hispiduli, 4–8 unc. longi, flexuosi. *Folia* $\frac{1}{3}$–1 unc. longa, læte viridia. *Pedunculi* $\frac{1}{2}$–1 unc. longi. *Flores* nutantes. *Corolla* et stamina non visa. *Capsula* globosa, 1$\frac{1}{2}$ lin. diametro, membranacea, pubescens, basi poris dehiscens. *Semina* minima, lenticularia, pallida, nitida.—A forma apetala *C. Kashmirianæ* differt pilis elongatis patulis, foliis non canis, et calycis laciniis majoribus herbaceis.

10. *Campanula argyrotricha*, Wall. (Flores dimorphi.)
Hab. In Himalayâ occidentali temperatâ, alt. 8000–12,000 ped. Kumaon! *Blinkworth*, &c.; Garwhal! *Strachey & Winterbottom*; Simla! (fl. æstate.) (v. v.)

11. *Campanula fulgens*, Wall.; Wight, Icon. t. 1179; Illustr. t. 136.
Hab. In montibus subtropicis, alt. 4000–6000 ped., Khasiæ! Himalayæ centralis! et orientalis! (Nepal et Sikkim); Peninsulæ mont. Nilghiri! et Canaræ!, necnon in insulâ Ceylon! (fl. æstate.) (v. v.)

12. *Campanula aristata*, Wall.
Hab. In regione alpinâ Himalayæ. Sikkim! alt. 12,000–16,000 ped.; Nepal! *Wallich*; Zanskar et Tibetiâ occidentali, alt. 13,000–14,000 ped.! *Strachey & Winterbottom*, &c. (fl. August.) (v. v.)

13. CAMPANULA (EUCODON) MODESTA (*Hf. & T.*). Pumila, glaberrima, uniflora, caule flexuoso simplici, foliis radicalibus petiolatis obovato-

oblongis rotundatisve, caulinis lineari-lanceolatis, flore nutante, calycis tubo lineari-clavato glaberrimo laciniis subulatis corolla campanulata breviter 5-loba ½ breviore, stigmatibus 3 revolutis, capsula erecta obconica prismatica apice contracta, pedunculo apice incrassato alato torto.

Hab. In regione alpinâ Himalayæ orientalis, prov. Sikkim, alt. 11,000–14,000 ped.! (fl. Aug.) (v. v.)

C. aristatæ Wall. affinis, differt statura humiliore, robustiore, calycis laciniis multoties brevioribus, et præcipue forma capsulæ. Herba 3–4-pollicaris, caule tereti striato, foliis radicalibus ¼ unc. latis, caulinis ½ unc. longis. *Flores* parvi. *Calycis* tubus 2 lin. longus. *Corolla* cærulea, 2–4 lin. longa. *Anthera* linearis apiculata, filamento lineari glaberrimo paulo longior et latior. *Stigmata* 3 revoluta. *Capsula* coriacea, pyriformis, profunde sulcata, lateraliter dehiscens, nitida, sæpe atra, ½ unc. longa. *Semina* minima, lenticularia, nitida.

14. CAMPANULA (EUCODON) KHASIANA (*Hf. & T.*). Hispidulo-pubescens, caule simplici erecto stricto subrobusto sulcato, foliis suberectis sessilibus obovato-oblongis acuminatis serratis utrinque hispidulo-pubescentibus subtus reticulatim venosis, racemo elongato terminali simplici v. paniculatim ramoso, floribus mediocribus nutantibus breve pedicellatis pedicellis bracteatis, calycis tubo subgloboso lobis setaceo-lanceolatis serratis corolla glabra ampla campanulata breviter 5-loba ½ brevioribus, stylo gracili subexserto, stigmatibus 2 brevibus.

Hab. Montibus Khasia graminosis regionis temperatæ, alt. 5000–6000 ped.! *Griffith, Lobb,* &c. (fl. July.) (v. v.)

Species pallidior, 1–3 pedalis. *Caulis* basi crass. pennæ anserinæ. *Folia* 1½–3 unc. longa. *Flores* numerosi, remoti. *Calyx* glaber. *Bracteæ* anguste lanceolatæ, serratæ. *Corolla* ¾ unc. longa, e basi ad faucem sensim ampliata hinc subinfundibuliformi-campanulata, interdum 6–8-loba. *Filamenta* basi dilatata pilis copiosis ciliata, superne filiformia. *C. rapunculoidi* habitu et staturâ similis.

15. CAMPANULA (EUCODON) THOMSONII (*Hf.*). Glaberrima v. inferne puberula, caule erecto subramoso gracili ramisque subangulatis, foliis (radicalibus subnullis) gracili-petiolatis ovatis ovato-cordatisve acutis v. apice attenuatis subserratis tenuiter membranaceis, floribus (inter minoribus) ramulis elongatis gracilibus laxe paniculatis pedicellatis erectis, calycis tubo glaberrimo breviter turbinato segmentis bracteolisque ad basin pedicellorum setaceis, corolla late campanulata profunde 5-fida tubo segmentis calycis breviore segmentis elongatis patentibus lineari-oblongis, stylo crassiusculo longo clavato, stigmatibus 2 brevibus.

Hab. In Himalayæ occidentalis sylvis temperatis in prov. Jamu, alt. 6000–7000 ped.! (fl. April.) (v. v.)

Radix lignosa, perennis. *Herba* gracilis, tenera, plerumque glaberrima, parce ramosa, spithamæa ad bipedalem. *Folia* infima interdum obovata, cætera omnia inter se conformia v. suprema angustiora, omnia 1–2 unc. longa in petiolum gracilem superne alatum abrupte angustata, sicco translucida, irregulariter serrata, basi sæpe inæquilateralia. *Panicula* simplex v. ramosa, 6–8-flora, rarius 20–40-flora. *Pedicelli* graciles. *Calycis* tubus 1–2 lin. longus, subglobosus, profunde sulcatus; segmentis 2–4 lin. longis. *Corolla* alba? sub ½ unc. lata. *Filamenta* brevia, basi dilatata, ciliata; *antheræ* lineari-elongatæ post anthesin tortæ. *Styli* pars pilosa elongata columnaris.

Campanula anagalloides, Royle (Ill. 254 sine descript.), est *Cephalostigma hirsutum*, Edgw.

Gen. IX. PERACARPA, *Hf. & T.*

Calycis tubus obconicus, limbi lobis triangularibus. *Corolla* campanulata, profunde 5-loba, lobis æqualibus linearibus acuminatis. *Stamina* epigyna, filamentis linearibus liberis; antheris linearibus. *Stylus* elongatus, stigmatibus 3 revolutis. *Ovarium* 3-loculare. *Capsula* oblonga, pendula, tenuiter membranacea, apice contracta, oligosperma, irregulariter rupta. *Semina* magna, oblonga, testa coriacea.—Herba *debilis, ramosa, tenella, carnosula, prostrata v. repens, glaberrima;* foliis *petiolatis, ovatis, subacutis, sinuato-dentatis, pollicaribus;* pedicellis *axillaribus, gracilibus, erectis;* floribus *parvis, albis;* capsula *pendula, torulosa* (nomen *e πήρα saccus* et *καρπός*).

1. *Peracarpa carnosa*, Hf. & T.—Campanula carnosa, *Wall. Cat.* 1282, *et in Roxb. Flor. Ind.* ii. 102; *A. D.C. Prod.* vii. 474.

Hab. In sylvis humidis regionis temperatæ Himalayæ centralis! et orientalis! alt. 6000–10,000 ped., Nepal! Kumaon! *Strachey & Winterbottom, Wallich*; Sikkim! necnon in Mont. Khasia, alt. 5000–6000 ped.! (fl. Jul.) (v. v.)

Gen. X. PENTAPHRAGMA, *Wall.*

1. *Pentaphragma begoniæfolium*, Wall.

Hab. In Peninsulâ Malayanâ, ad Penang! *Wallich*; Singapore! *Lobb* et Mergui! *Griffith.* (fl. ?)

Quid *Symphyandra stylosa*, Royle, e Himalaya occidentali!

Tribe II. LOBELIEÆ.

Gen. XI. PIDDINGTONIA, *D.C.*

1. *Piddingtonia nummularia*, Lamk.

Hab. In montibus subtropicis Khasiæ et Himalayæ orientalis et centralis; alt. 4000–7000 ped. frequens (fl. temp. pluv.) (v. v.).—*Distr.* Java! et China!

* Isolobus.

* *Isolobus Roxburghianus*, D.C.; an Lobelia cæspitosa, *Blum.*?

Hab. In horto botanico Calcuttensi! versosimiliter e China introducta. In hortis Anglicis mont. Khasiæ, alt. 4000 ped.! (v. v.) (fl. August.) —*Dist.* Java! et China!

Gen. XII. Speirema, *Hf. & T.*

Calycis tubus globosus, limbi lobis lineari-subulatis, patentibus revolutisve. *Corolla* dorso ad basin fissa, bilabiata, labio superiore inferiore longiore lobis 2 linearibus acuminatis, inferiore subspathulato trilobo lobis lanceolatis acuminato-caudatis. *Antheræ* marginibus pilosis, 2 inferiores apice penicillatæ. *Fructus* globosus, subcarnosus, irregulariter ruptus, 2-locularis. *Semina* numerosissima, testa lævi coriacea.—Herba *elata, glaberrima, divaricatim ramosa; ramis pedalibus gracilibus prostratis; foliis* 2-4-*pollicaribus subdistichis secundisve, petiolatis, ovato-lanceolatis, longe acuminatis, irregulariter subduplicato-serratis;* pedunculis 1-2-*pollicaribus, solitariis, axillaribus,* 1-*floris, elongatis;* floribus *suberectis, luride purpureis;* corolla *sub* $\frac{2}{3}$ *unc. longa, intus parce pilosa, calycis lobis angustissimis longiore;* bacca *globosa, membranacea v. subcarnosa.* (Nomen *σπείρημα, spira,* ad calycis lacinias apice revolutas refert.)

1. *Speirema montanum*, Hf. & T.—Lobelia montana, *Blume, Bijd.* 728; *A. D.C. Prodr.* vii. 387.

Hab. In Sylvis Himalayæ regionis temperatæ provinciæ Sikkim, alt. 5000–7000 ped.! (fl. temp. pluv.) (v. v.)—*Distr.* Montibus Javæ!

Stirps Javanica ab Himalaica nullo modo differt.

Gen. XIII. Lobelia.

1. *Lobelia trigona*, Roxb. (Antheræ omnes apice penicillatæ), cf. *L. Zeylanica*, Linn.; *L. trialata*, Ham.; *L. micrantha*, Hook.; *L. Reinwardtiana*, D.C.? *L. subincisa*, Wall.

Variat insigniter staturâ, caule crassiusculo v. gracili, erecto ramoso v. prostrato, foliis subsessilibus v. petiolatis, oblongis ovatis cordato-ovatisve, floribus axillaribus v. in paniculas terminales dispositis, corolla læte cærulea v. purpurea interdum saturate azurea.—An species 2 hic confusæ diutius inquirendæ?

Hab. Per totam Indiam (præcipue oryzetis) vulgatissima, a Birma! et Peninsula Malayana! usque ad Simla! in montibus Himalayæ crescit ad 6000 ped.! (fl. per totum annum) (v. v.)—*Distr.* China! Java!

2. *Lobelia affinis*, Wall.; cf. *L. succulenta*, Blume.

Hab. In Ceyloniâ! *Walker, Gardner, Thwaites* (C. P. cum 1776 et 2981 mixta) et Peninsulâ Malayanâ ad Malacca! *Lobb*; in Bengaliâ orientali! et montibus subtropicis Himalayæ orientalis! (Sikkim!) et montibus Khasiæ ad ped. 7000 ascendens haud infrequens! (fl. temp. pluv.) (v. v.)—*Distr.* China! Java!

Herba variabilis, cum *L. trigonâ* et *Piddingtoniâ* sæpe confusa.

3. LOBELIA LOBBIANA (*Hf. & T.*). Caule decumbente v. prostrato ramoso glaberrimo debili, ramulis puberulis, foliis petiolatis ovatis acutis argute serrulatis glaberrimis v. petiolo et costa puberulis, floribus axillaribus solitariis longe pedicellatis, pedicellis gracilibus folio æquilongis, calycis tubo puberulo lobis lineari setaceis patulis v. recurvis, corollæ tubo duro ad basin fisso breviter bilabiato labio inferiore trifido lobis oblongo-lanceolatis lateralibus subsimilibus, antheris glabris 2 inferioribus apice penicellatis.

Hab. Mont. Khasiâ! *Lobb.*

Species habitu et foliis *L. affinis* sed major, foliis 1–2-pollicaribus membranaceis, pedicellis valde elongatis gracilibusque, floribus triplo majoribus et tubo corollæ triplo longiore. *Calycis* lobi $\frac{1}{3}$ unc. longi, iis *Speirematis montani* subsimiles. *Corolla* fere $\frac{1}{2}$ unc. longa, tubo labiis duplo longiore.

4. LOBELIA GRIFFITHII (*Hf. & T.*). Pusilla, subaphylla, erecta, glaberrima, caule tenui simplici v. diviso, foliis squamæformibus distantibus erectis lanceolatis acuminatis, floribus parvis erectis v. inclinatis gracile pedicellatis caulem ramosve terminantibus, calycis tubo ovoideo lobis lanceolatis æquilongo, corollæ glabræ labro superiore inferiore breviore lobis acuminatis inferiore late trifido lobis brevibus acuminatis, staminibus glaberrimis, antheris omnibus apice penicillatis.

Hab. Peninsulâ Malayanâ ad Mergui! *Griffith.*

Species singularis, *L. trigonæ* affinis, *L. exili,* Hochst. Abyssiniæ simillima. *Caulis* 2–9 uncialis, e basi ad apicem sensim attenuatus, subsucculentus? simplex v. si divisus ramis erectis. Folia 1–1$\frac{1}{2}$ lin. longa, alterna. *Flores* cærulei, 1 lin. longi. *Calycis* lobi tubo subæquilongi, corolla $\frac{1}{2}$ breviores.

5. *Lobelia colorata,* Wall.; Wight, Icon. 1179.

Hab. Collibus siccis montium Khasiæ, regione temperatâ, alt. 5000–6000 ped.! *De Silva*; *Lobb.* (fl. August.)

6. LOBELIA ERECTA (*Hf. & T.*). Puberula v. glabrata 2–6-pedalis, caule striato erecto virgato subsimplici tereti puberulo folioso, foliis ellipticis elliptico-lanceolatisve obtusis obscure sinuato-dentatis, racemis strictis elongatis simplicibus basi foliosis, floribus brevi-pedicellatis, calycis tubo pubescente globoso laciniis lanceolatis subdentatis tubo corollæ pubescente $\frac{1}{2}$ brevioribus, corollæ labii superioris laciniis linearibus inferioris trifidi laciniis ovatis acuminatis, antheris glabris 2 inferioribus apice penicillatis.

Hab. Himalayæ orientalis regione temperatâ, Sikkim, alt. 9000–13,000 ped.! (fl. August.) (v. v.)

Herba erecta, caule subrobusto. *Folia* 2–3 unc. longa, subsessilia v. in petiolum breviusculum augustata. *Flores* numerosi, bracteati; bracteæ inferiores foliaceæ, superiores calycem superantes. Pedicelli 2–3 lin. longi, fructiferi elongati. *Corolla* sub. ½ unc. longa, sordide cærulea, labio superiore longiore, tubo intus piloso. *Capsula* membranacea, globosa, fere ½ unc. diametro, apice 2 valvis. *Semina* numerosissima, lenticularia.

L. coloratæ etc. affinis, differt conspicue caule simplici et calycis lobis brevibus.

7. *Lobelia pyramidalis,* Wall. Cat. 1302. ex parte—(antheræ glabræ).
Hab. In regionibus temperatis montium Khasiæ! et Himalayæ centralis et orientalis, alt. 5000–9000 ped.! Sikkim! Nepal! Kumaon! et Garwhal! *Wallich,* &c. (fl. temp. pluv.) (v. v.)

8. *Lobelia Wallichiana,* Hf. & T. (antheræ pilosæ et ciliatæ). *Rapuntium Wallichianum,* Presl. *L. pyramidalis β,* D.C.
Hab. In regionibus subtropicis montium Khasiæ! et Himalayæ centralis et orientalis a Sikkim! ad Kumaon! alt. 4000–7000 ped.! *Wallich* &c. (fl. temp. pluv.) (v. v.)

9. *Lobelia excelsa,* Leschenault (Wight, Ic. t. 1173, 1174).
Hab. Montibus Ceyloniæ! et Nilghiri! frequens (fl. temp. pluv.).

10. *Lobelia nicotianæfolia,* Heyne (Wight, Ill. t. 135); an forma *L. excelsæ*?
Hab. Montibus Peninsulæ Nilghiri! et Canara! frequens montibus Ceyloniæ!

11. *Lobelia aromatica,* Moon; (Wight, Ic. 1172). "Media inter *L. nicotianæfoliam* et *L. excelsam,*" Wight, *l. c.*;—mera varietas *L. nicotianæfoliæ* nobis videtur.
Hab. Regione temperatâ insulæ Ceylon!

12. *Lobelia rosea,* Wall.—*L. trichandra,* Wight, Ic. 1171.—*L. pyramidalis*? Hohen. Plant. Nilgh. 1367.
Hab. In Himalayæ centralis et orientalis regione subtropicâ Nepal! *Wallich*; Sikkim, alt. 3500 ped.! *J. D. H.*; montibus Khasiâ! *Domina Mack*; montibus Nilghiri! *Wight,* &c. (fl. Jan. April.) (v. v.)
Inter *L. nicotianæfoliam* et *Wallichianam* media. Cl. Wight descripsit varietatem antheris glabris.

L. chenopodifolia et *L. incisa,* Wall. sunt *L. cliffortioides,* Linn.

Species nobis incognitæ:—
L. arenarioides, Wall.
L. Sebæ, D.C.
L.? *pumila,* Burm.

Memorandum on the Principles of Generic Nomenclature in Botany, as referred to in the preceding Paper. Drawn up by G. BENTHAM, Esq., F.L.S.

[Read March 3rd, 1857.]

Two of the chief objects of the systematist in botany are, first, to collect plants into natural groups of successively higher value and greater scope according to their mutual affinities; and, secondly, to fix upon certain stages of these successive groups to which names should be attached for the purpose of reference. It is to the latter of these objects that we would now chiefly direct our attention.

The grand object accomplished by Linnæus in his nomenclature was to create a language by which plants could be spoken of, and by means of which groups of species (called *genera*) could be referred to, classed and treated of as easily as the species themselves.

He accordingly, treating his genera as *entities* (to use a word of Jeremy Bentham's) as natural as species, distributed them for practical purposes into his well-known artificial Classes and Orders.

The evident facilities for scientific study afforded by this grouping of species into natural genera, prompted Jussieu to carry the principle much higher; and, whilst he retained Linnean genera as the basis of botanical language, he established, for the purposes of science, his *natural orders* or groups of genera, which are in fact nothing more than genera of a higher grade, and he distributed these orders or large genera into classes and subclasses.

This system of—

Species grouped into natural genera,
Genera grouped into natural orders, and
Orders arranged in classes more or less natural;

with a language of—

Substantive names for the genera,
Adjective adjuncts for the species, and
Substantively taken adjectives for the orders,

has been ever since universally followed in theory, but has been most inconveniently departed from in practice.

With the great increase in the number of species known, and the increased facilities for the study of affinities afforded by the

Linnean language and the Jussieuan principles, botanists became aware that the species of a genus and the genera of an order could be collected into intermediate groups as natural and as well defined as the genera and orders themselves, and that names were, for scientific purposes, as useful for these subordinate groups as for those genera or orders.

To carry this into practice two different courses have been adopted:—

1. To maintain the original genera and orders in their integrity (except where a mistaken view of their affinities required them to be remodelled), calling the lower groups formed for scientific purposes *subgenera*, *sections*, *subsections*, *divisions*, &c., or *suborders*, *tribes*, *subtribes*, *divisions*, &c., as the case may be;—to maintain the original names for the purposes of language;—and, for the purposes of science, to give to the subordinate groups substantive or substantively taken adjective names as the case may be, whenever these subordinate groups are so well defined or so natural, that, *but for the convenience of language*, they might have made good genera or orders;—and, when these subordinate groups are less defined or less natural, either to give them no names at all, distinguishing them by figures or signs such as *, **, &c., or §1, §2, &c., or to give them mere adjective names.

Or 2ndly. To consider even the lowest of these intermediate groups between species and original genera, or between genera and original orders, as so many independent genera or orders, with their corresponding substantive or substantively taken adjective names expected to be introduced into ordinary botanical language.

The first of these courses appears to be the only one which can save botanical nomenclature from replunging into the chaos in which Linnæus found it. It was strongly advocated by the elder De Candolle; although in the latter years of his life, seeing how general was the disposition to convert his subgenera and sections into genera, and his suborders and tribes into orders, he himself more or less gave in to the general practice. The same principle was adopted by Endlicher, but he again was disposed to go too far in giving substantive names to purely technical or ill-defined subsections of genera.

The second course is that which is now unfortunately but too general. Independently of a natural pride we all feel in establishing new genera or orders, it is felt how useful it is, in the study of affinities, to define correctly and give names to all natural groups of every grade, however numerous they may be, and how easy it is, in the immense variety of language, to coin these names indefinitely; but it is not perceived that in attempting to introduce them all into ordinary botanical language, the memory is taxed beyond the capabilities of any mind, and the original and legitimate object of the Linnean nomenclature is wholly lost sight of. In a purely scientific point of view it matters little if the orders are converted into classes or alliances, the genera into orders, and the sections and subsections into genera; their relative importance does not depend on the names given to them, but on their height in the scale of comprehensiveness; but, for language, the great implement, without which science cannot work, it is of the greatest importance that the groups which give their substantive names to every species they include should remain large. If, independently of the inevitable increase of genera by new discoveries, such old ones as *Ficus*, *Begonia*, *Arum*, *Erica*, &c. are divided* into 10, 20, 30 or 40 independent ones, with names and characters to be recollected before any one species can be spoken of, if genera are to be reckoned by tens of thousands instead of thousands, the range of any individual botanist will be limited to a small portion of the whole field of the science. So also, so long as the number of orders can be kept within, or not much beyond a couple of hundred, it may reasonably be expected that a botanist of ordinary capacity shall obtain a sufficient general idea of their nature and characters to call them at any time individually to his mind for the purpose of comparison; but double that number, and all is confusion.

This inevitable confusion and the necessity of maintaining in some way the larger groups have been perceived by those even who have gone the farthest in lowering the scale of orders and genera. As a remedy they propose to erect the old genera into independent orders, and the old orders into classes or alliances. This is but an incomplete resumption of the old principles without the advantages of the old nomenclature.

It must be recollected that, although we choose a well-defined and natural group as the one to which we give a generic name, yet this is no indication that that group is considered as the *best* defined and better defined than the group immediately above it; on the contrary it is frequently less so. It is by no means pretended that *Urostigma* or *Pharmacosyce* are better defined than the old genus *Ficus*, or that the new genera that have lately been cut out of the old genus *Begonia* form more natural groups than *Begonia* itself does; but the principle in these cases seems to be adopted, that the lowest definable group above a species is a genus. Go a step farther, and every species becomes a genus with a substantive name!

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* And it must be borne in mind, that if genera so eminently natural and universally recognized as these, are to be thus subdivided and renamed for ordinary botanical parlance, so must *Carex*, *Rubus*, *Salix*, and hundreds of other equally well-established genera be.

And let it not be forgotten, that although the analytical process carried to the uttermost is necessary for the purpose of ascertaining the facts upon which botanical science is based, it is a judicious synthesis alone which can enable the human mind to take anything like a comprehensive view of those facts, to deduce from them the principles of the science, or to communicate to others either facts or principles.

Synopsis of the genus *Clitoria*.

By GEORGE BENTHAM, Esq., F.L.S.

[Read March 3rd, 1857.]

IN working up the *Phaseoleæ* with a view to defining the limits of the Brasilian species for Von Martius's Flora, the genus *Clitoria* has appeared to me to present some points of interest, as well in regard to its geographical distribution, as to its systematic demarcation. I have therefore been induced to offer to the Linnean Society the following short synopsis, prefaced by a few general remarks on both these points.

Of the two principal types of the genus, the one, *Ternatea*, is African and Asiatic, but apparently confined in Africa to the eastern tropical coast and adjacent Mascarene Islands, and in Asia to the nearly adjoining western districts of East India. The other type, *Clitoria* proper, is American, widely distributed over South America, east of the Andes, stretching northward into the southern United States of North America, and westward to the Cordilleras, in Mexico and Central America; but, even there, scarcely crossing to the west coast. It is one of the northern species of this American type, ranging on that continent from New Jersey to Mexico and Oaxaca, that reappears in great profusion in a very limited district in the Khasiya mountains in East Bengal, as well as in Tavoy, where it is accompanied by another apparently distinct species, found also in Java, but of the same North American type.

This singular identity of species in these two districts so widely separated, has been noticed before, but only in one or two instances considered as quite exceptional. The case of the *Phryma leptostachya* has long been known, and is mentioned by Alph. De Candolle in his enumeration of what he terms *espèces disjointes*, which may be rendered by *discontinuous* or *dissevered* species. He also alludes to the *Saururus cernuus* as common to North America and China; the very remarkable circumstance of the rare *Tipularia* occurring at once in the eastern United States and in the Himalayas, was alluded to by Dr. Lindley, in a paper recently read to the Society; and we may now mention, as additional instances of perfect identity, the *Osmorhiza brevistylus* and *Monotropa uniflora*, common to these widely distant regions. My *Amphicarpæa Edgworthii*, from the Himalaya, is so closely allied to the common North American *A. monoica*, that the trifling differences observed in the few specimens examined would probably disappear in other specimens. And in such genera as *Schizanthus*, *Podophyllum*, *Thermopsis*, *Astilbe*, *Itea*, *Adenocaulon*, *Glossanthus*, *Turpinia*, *Streptopus*, *Trillium*, and many others—although the N. American or Mexican and Himalayan species may not be identical—yet their close affinity, in well-marked genera containing but very few species, has almost equal weight in regard to their geographical distribution.

The *Clitoria* which has been the occasion of these remarks is the *C. acuminata*, Wall., a common Khasiya plant, which proves to be identical with the original *C. Mariana*, Linn., from North America. When I gave a diagnosis of Wallich's plant in the 'Plantæ Junghuhnianæ,' this similarity did not strike me, owing to the greater luxuriance of the Indian specimens, their larger stipules, more pointed leaflets and calyx lobes, &c., frequent results of luxuriance in allied species; whilst the few American species I then possessed were all from the dry soils where they are said to grow in the United States. Having now, however, had before me a large number of specimens from a great variety of localities, I found, when I came to draw up comparative characters for the two supposed species, that several of the more luxuriant American ones from Texas and Mexico were, in the above-mentioned points also, identical with the East Indian plant.

The *C. macrophylla*, Wall., from Tavoy and Java, only known by a small number of specimens, still remains a detached East Asiatic representative of a considerable American type; a fact which calls to mind how frequently large American genera (such as *Eupatorium* *Aster*, *Solidago*, *Solanum*, &c.) are represented in Eastern Asia by a small number of species, which gradually diminish or disappear altogether as we proceed westward towards the Atlantic limits of Europe; whilst the types peculiar to the extreme west of Europe (excluding, of course, the Arctic flora) are wholly deficient in America. These are among the considerations which suggest an ancient continuity of territory between America and Asia under a latitude, or at any rate with a climate, more meridional than would be effected by a junction through the chains of the Aleutian and Kurile Islands.

In a systematic point of view I had formerly endeavoured to render *Clitoria* more natural, by the elimination of DeCandolle's section *Centrosema*; and I now find it necessary for the same purpose to unite with it the *Neurocarpum* of Desvaux, hitherto universally adopted by other botanists, myself included. This entails the giving up, as a generic character, one which, in *Leguminosæ*, is usually considered as absolute, the raised longitudinal nerve or wing along the centre of each valve of the pod. It is the same peculiarity which has induced the separation of *Tetragonolobus* from *Lotus* among European plants. But in the division of *Lotus*, as well as in that of *Clitoria*, this purely technical character is unaccompanied by any other differences, and I have now instances in *Clitoria* where it is inconstant in one and the same species, and even on the same specimen.

Before the introduction of Jussieu's natural system, carpological characters were comparatively little attended to; but from the time he first pointed out their great importance, the absolute necessity of taking them into consideration in all natural classifications, has been very properly insisted on by all the great botanists of modern days. There are instances, however, in which this principle may have been carried too far. The external forms acquired by fruits in their development from the ovary to maturity, and especially the foliaceous appendages they assume, are sometimes irrespective of their organic structure, and appear then of little more consequence than the foliaceous wings or appendages on the branches, inflorescences, or calyx tubes. So also the form of the membranous expansions of samaroid fruits, the consistence of pericarps, the number and arrangement on the calyx and other foliaceous appendages of the oleaginous deposits, called *transparent glands* in *Leguminosæ*, *Hypericineæ*, &c., or *vittæ* in *Umbelliferæ*, useful as they all may be in certain cases, as indicative of general organic differences, have yet *per se* but little absolute value in classification. This absolute reliance, in supposed conformity to general principles, upon such characters, even when unaccompanied by any other differences, is one of the sources whence botanical science is daily inundated by torrents of new genera, which threaten ere long completely to drown all system. Where the presence or absence of these appendages or glands, or any peculiarity in their arrangement, appears to be consequent upon a general difference in the plan of the fruit or in the habit of the plant, or is accompanied by corresponding characters in other organs, it should be carefully attended to. But where one or more species of a natural genus differ from the rest by some such external peculiarity in the development of the fruit alone, it seems against all principles laid down for a natural method, to take that peculiarity as a generic character, merely because it is a carpological one.

Neglecting, therefore, entirely the longitudinal wing of the pod (the development of lateral nerves in the carpellary leaf), we have a genus at once known by its calyx and corolla, and separable into two, or rather into three, types by habit and foliage, and probably also by the seed. So far as known, at least, the seeds of the sections *Ternatea* and *Neurocarpum* or *Clitoria* proper, are very different. I have collected the shrubby or lignescent American species into a third section, characterized by their habit only; for although in some species I have seen pods apparently full grown, yet the seeds are not far enough advanced to say whether they are compressed and smooth, as in *Ternatea*, or endued with the peculiar viscid exudation of *Neurocarpum*.

In nearly all the *Clitorias*, whether with or without winged pods, the lower flowers are often apetalous, almost without stamens, and with smaller calyxes, but producing perfect fruits. This circumstance, long since known in the allied genus *Amphicarpæa*, and more recently observed in *Clitoria glycinoides*, led, when first discovered, to the establishment of Leandro de Sacramento's genus *Martia*, in which Zuccarini included a similarly circumstanced species of *Galactia*.

CLITORIA.

Clitoriæ sp. Linn.—*Ternatea* et *Neurocarpum*, Desv.—H. B. et K. Nov. Gen. et Sp. Amer.—*Clitoria*, Sect. 1 et 2, et *Neurocarpum*, D.C. Prod. vol. ii.—*Clitoria* et *Neurocarpum*, Benth. in Ann. Mus. Vind. vol. ii.

Calyx tubulosus, apice 5-fidus, laciniis superioribus latioribus, summis sæpe altius connatis, infima angustiore. Vexillum amplum, emarginatum v. bifidum, basi in unguem latum angustatum, exappendiculatum. Alæ falcato-oblongæ, vexillo breviores, longe unguiculatæ, patentes, carinæ breviori falcatæ acutæ cohærentes. Stamina mona-

delpha v. filamento vexillari demum soluto diadelpha. Ovarium stipitatum, basi disco brevi cupulato circumdatum, pluriovulatum. Stylus incurvus, apice plus minus dilatatus, facie interiore longitudinaliter barbatus. Legumen stipitatum, lineare, valvulis planis v. convexis, nudis v. medio costa longitudinali percursis. Semina compressa v. subglobosa, estrophiolata.

Herbæ fruticesve, nunc volubiles v. alte scandentes, nunc humiles suberecti v. prostrati, Americani, Asiatici v. Orientali-Africani. Stipulæ persistentes, sæpe lineatæ. Folia pinnatim tri-pluri-foliolata, foliolis oppositis cum impari distante, stipellis setaceis, rarius subnullis. Pedunculi axillares, 1–2-flori v. racemiferi, floribus secus rachin solitariis v. sæpius geminis. Bracteæ persistentes, stipulis similes v. sæpius majores, inferiores binæ oppositæ distinctæ, superiores solitariæ (duæ in unam coalitæ). Bracteolæ sub calyce geminæ, vulgo bracteis majores. Flores speciosi (sæpe 2–3-pollicares) purpurascentes, cærulei, albi v. rubri.

Sect. I. Ternatea.

Caulis herbaceus v. rarius fruticosus, prostratus, volubilis v. scandens. Folia 5–9-foliolata rarius subtrifoliolata. Leguminis valvulæ planæ v. leviter convexæ, non costatæ. Semina subreniformia, compressa, lævia.

1. C. lasciva, *Boj.* (Benth. in Ann. Mus. Vind. vol. ii. p. 114), caule fruticoso volubili foliisque subtus tomentoso-pubescentibus, foliolis 7–11 ovatis v. ovato-lanceolatis, stipellis setaceis, pedunculis elongatis bi-pluri-floris, bracteolis late ovatis acutis calycis dimidio brevioribus, legumine pubescente.

Hab. In ins. Madagascaria, ubi scandet in arbores et frutices, ad margines fluviorum provinciæ Betanimena oræ orientalis (*Bojer*).

2. C. ternatea (Linn. Spec. Pl. p. 1086), herbacea volubilis puberula, foliolis 5–7 rarius 9–11 ovatis oblongisve, pedunculis brevibus unifloris, bracteolis late ovatis orbiculatisve calycis dimidium subæquantibus, legumine acuminato pubescente.

C. ternatea, Bot. Mag. t. 1542.—*Ternatea vulgaris*, H. B. et K. Nov. Gen. et Sp. Amer. vol. vi. p. 415.

Hab. In Asiæ, Africæ, et Americæ regionibus calidioribus frequentissime culta et hinc inde quasi spontanea, verosimiliter in Africa orientali tropica indigena.

Foliola vulgo pollicaria v. majora. Flores azurei, fere bipollicares.

3. C. pilosula (Wall. Cat. Herb. Ind. n. 5347), herbacea volubilis pilosula, foliolis 5–7 parvis ovatis oblongisve, pedunculis brevibus unifloris, bracteis late ovatis orbiculatisve calycis dimidio brevioribus, legumine pubescente mutico.

Hab. In Indiæ Orientalis Peninsulæ provincia Concan (*Stocks*).

An *C. ternateæ* var.? Specimina pauca quæ vidi differre videntur foliolis floribusque multo minoribus, legumine rectiore, vix 1½ poll. longo, 2½-3 lin. lato.

4. C. HETEROPHYLLA (Lam. Dict. vol. ii. p. 51), glabra, caule tenui volubili, foliolis 5-7 parvis reticulatis foliorum inferiorum orbiculatis superiorum linearibus, stipellis minutis v. nullis, pedunculis brevibus unifloris, bracteolis ovatis acutis calyce pluries brevioribus, legumine plano glabro.

Hab. In ins. Mauritio (*Sieber*, n. 151, *Telfair*, *Gardner*, &c.).

5. C. BIFLORA (Dalz. in Hook. Kew Journ. Bot. vol. ii. p. 35), herbacea pilosula suberecta, foliolis 3-5 ellipticis lanceolatisve, stipellis setaceis, floribus geminis subsessilibus reflexis, egumine brevi falcato plano pubescente.

Hab. In India Orientali prope Bombay (*Dalzell*, *Law*, *Stocks*, &c.).

Species inflorescentia et legumine distinctissima. Flores pro genere parvi.

6? C. PEDUNCULATA (Boj. Benth. in Ann. Mus. Vind. vol. ii. p. 114), glabra, caule filiformi, foliolis 3 lanceolato-linearibus acutiusculis, stipellis subnullis, pedunculis filiformibus unifloris, bracteolis lineari-lanceolatis acutis calyce multo brevioribus.

Hab. In ins. Madagascaria inter frutices ad margines fluviorum (*Bojer*).

Specimina olim vidi in herbario Musæi Vindobonensis. Species mihi videbatur *C. heterophyllæ* valde affinis, sed diversa foliolis (an constanter) 3 nec pluribus duplo longioribus, et pedunculis longis tenuibus.

Sect. II. NEUROCARPUM.

Herbæ volubiles v. prostrati v. breviter erecti. Folia uni- vel trifoliata. Leguminis valvulæ convexæ, costa longitudinali medio percursæ v. rarius ecostatæ. Semina globosa, ovoidea v. crasse subreniformia, extus glanduloso-viscosa.

* *Caule herbaceo volubili.*

7. C. MACROPHYLLA (Wall. Cat. Herb. Ind. n. 5345), caule rigido subvolubili piloso v. glabrato, foliolis 3 ovalibus subcoriaceis supra glabris subtus appresse pilosis, racemis brevissimis confertis, bracteis oblongis calycis tubo brevioribus, vexillo villoso, legumine glabro ecostato.

C. javanica, Miq. Fl. Ned. Ind. vol. i. p. 226.

Hab. In India Orientali, in montibus Prome et Tavoy (*Wallich*). In Java (*Horsfield*).

Foliola 3-4-pollicaria, petiolo communi flores superante. Flores 1¾ poll. longi. Legumen bipollicare.

8. C. MARIANA (Linn. Spec. Pl. p. 1026), glabra v. vix pilosula, caule prostrato v. volubili, foliolis 3 ovato-oblongis v. lanceolatis membranaceis sæpius acutis, pedunculis 1-3-floris, bracteolis lanceolatis calyce multo brevioribus, vexillo glabro, legumine glabro ecostato.

C. Mexicana, Link. Enum. vol. ii. p. 235.—*C. acuminata*, Grah. in Wall. Cat. Herb. Ind. n. 5346.—*C. Grahami*, Steud. Nom. Bot. ed. 2; Benth. in Pl. Jungh. vol. ii. p. 30.

Hab. In America septentrionali, in solo sicco præsertim secus fluvia a New Jersey ad Floridam et Alabama (*Torrey, Gray,* &c.). In prov. Texas (*Drummond, Lindheimer,* &c.); in Mexico in dumetis prope Jalapam (*Schiede et Deppe, Linden,* n. 689), prope Talea (*Hartweg*), in præruptis prov. Oaxaca, altit. 3000–4000 ped. (*Galeotti,* n. 3146), et in India orientali in montibus Khasiya, altit. 5000–6000 ped. (*Hooker fil. et Thomson, Griffith,* n. 343, *Lobb*), in Tavoy (*Wallich*).

Variat in solo pinguiore et calidiore foliolis et præsertim stipulis majoribus, calycis laciniis longioribus angustioribusque, &c., sed specimina Asiatica nequaquam a Mexicanis differunt.

9. C. GLYCINOIDES (D.C. Prod. vol. ii. p. 234), herbacea volubilis pubescens v. villosa, foliolis 3 ovatis oblongisve subtus sericeo-pubescentibus villosisve, pedunculis 1–3-floris, bracteolis ovato-lanceolatis calyce multo brevioribus, legumine subfalcato valvulis medio costatis v. rarius subnudis.

C. falcata, Lam. Dict. vol. ii. p. 51 ex parte?*.—*Neurocarpum falcatum,* DC. Prod. vol. ii. p. 236.—*Clitoria rubiginosa,* Pers. Syn. vol. ii. p. 303.—*Neurocarpum glycinoides, rubiginosum, ellipticum* et *villosum,* Desv. cfr. Ann. Sc. Nat. Par. ser. 1. vol. ix. p. 413.—*Martia physalodes,* Leandr. Sacr. Denkschr. Acad. Mun. vol. vii. p. 23. t. 12.—*Martia brasiliensis,* Zuccar.—*Neurocarpum argenteum,* Duchass. et Walp. in Flora, 1853, p. 228.

Hab. In America orientali tropica frequens; in tota Brasilia, in Peruvia orientali (cis-Andina), Guiana, insulis Indiæ occidentalis, et in Panama.

** *Caule prostrato flagellari.*

10. C. FLAGELLARIS, herbacea, rufo-pubescens, ramis prostrato-flagellatis, foliolis 3 oblongo-lanceolatis obtusis utrinque villosulis, pedunculis 1–3-floris, bracteolis lato-lanceolatis calyce multo brevioribus, legumine costato.

Neurocarpum flagellare, Benth. in Hook. Journ. Bot. vol. ii. p. 58.

Hab. Ad Rio Branco Brasiliæ borealis (*Schomburgk*).

Specimina perpauca vidi a *C. glycinoide* distincta imprimis ramis non volubilibus et foliolis angustis.

11. C. RUFESCENS, herbacea procumbens (v. subvolubilis?), foliolis 3 oblongo-ovatis ellipticisve mucronatis subtus ramis pedunculisque rufo-villosis, pedunculis 1–3-floris, bracteolis ovato-acutis calyce multo brevioribus.

Neurocarpum rufescens, Benth. in Ann. Mus. Vind. vol. ii. p. 116.

Hab. In Brasiliæ campis editis ad Tejuco et Villa do Principe prov. Minas Geraes (*Martius*).

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* Lamarck's description of the fruit does not agree with that of this species, but DeCandolle, who saw the original specimen in Jussieu's herbarium, had certainly this plant in view. If the identity is confirmed, Lamarck's specific name should be adopted. That of Persoon is applicable only to the more hairy varieties.

Species e specimine unico descripta intermedia videtur inter *C. glycinoiden* et sequentes. Flores fere *C. guianensis* sed calyx rufo-villosus et bracteolæ latiores.

*** *Caule e rhizomate lignoso herbaceo ascendente v. erecto vix ramoso.*

12. C. NANA, herbacea pilosula v. glabrata, caule abbreviato, foliolis 3 oblongis ellipticisve, pedunculis unifloris, bracteolis lineari-lanceolatis calyce multo brevioribus, leguminis valvulis nudis.

Hab. In Brasiliæ meridionalis prov. Rio Grande, in campis siccis prope Porto Alegre (*Tweedie*).

Caules e rhizomate lignoso 1–4-pollicares. Planta cæterum formis minimis *C. guianensis* similis, sed floris color diversus videtur et leguminis valvulæ (semper?) ecostatæ.

13. C. SIMPLICIFOLIA, herbacea erecta subsimplex glabra, foliolo subsessili ovali obtuso basi rotundato, pedunculis bifloris racemosisve, bracteolis lanceolatis calyce multo brevioribus, leguminis valvulis costatis.

Neurocarpum simplicifolium, Kunth, Mimos. p. 213. t. 59.

Hab. In locis arenosis ad margines fluviorum, &c. ad flum. Orinoco (*Humboldt et Bonpland*), in Brasiliæ prov. Goyaz et Pernambuco (*Gardner*, n. 2822 et 3669).

Caules e rhizomate lignoso semipedales ad pedales. Foliola semper vidi solitaria subcoriacea. Flores *C. guianensis.*

14. C. GUIANENSIS, herbacea erecta v. adscendens glabra v. albopilosa, foliolis 3 longe oblongis linearibus v. imis solitariis, pedunculis 1–2-floris, bracteolis lanceolatis calyce multo brevioribus, leguminis valvulis costatis v. rarissime subnudis.

Crotalaria guianensis, Aubl. Pl. Gui. vol. ii. p. 761. t. 305 *.—*Crotalaria longifolia*, Lam. Dict. vol. ii. p. 201.—*Neurocarpum angustifolium*, Kunth, Mimos. p. 218. t. 60.— *N. guianense*, Desv. Journ. Bot. 1814, vol. i. p. 75. — *N. longifolium* et *N. frigidulum*, Mart., Benth. in Ann. Mus. Vind. vol. ii. p. 116.

Hab. —— ?

Caules e rhizomate lignoso semipedales ad pedales. Foliola sæpe semipedalia. Calyx 12–15 lin., corolla 2 poll. longa. Species differt a *C. nana* statura et legumine, a *C. simplicifolia* foliolis ternis angustis, a *C. cajanæfolia* statura humiliori, foliolis longioribus subtus minus canescentibus.

15. C. CAJANÆFOLIA, herbacea erecta plus minus canescens, foliolis 3 oblongis v. imis solitariis, pedunculis 1–2-floris, bracteolis ovatis calyce multo brevioribus, leguminis valvulis costatis v. rarius nudis.

Neurocarpum cajanæfolium, Presl. Symb. Bot. p. 17. t. 9.—*N. retusum*, Hassk. Pl. Jav. rar. p. 376.—*Lotus fluminensis*, Vell. Fl. Flum. vol. vii.

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* Aublet's drawing and description agree in everything but the corolla, which he evidently only had in an imperfect shrivelled state.

t. 132.—*Clitoria laurifolia*, Poir. Dict. Suppl. vol. ii. p. 301.—*Neurocarpum laurifolium*, Desv. (forma glabrior legumine sæpius ecostato).

Hab. In Brasiliæ et Guianæ collibus imis arenosis frequens, etiam in ins. Trinitatis (*Sieber*, n. 187), Porto Rico et S. Domingo (*Poiteau* in Herb. Mus. Par.), et ex America allata in Java (*Zollinger*, n. 748, v. 784 in Herb. meo), Malacca (*Griffith*), et Singapore (*Herb. Hooker*).

A *C. guianensi* vix characteribus certis definienda etsi habitu facile recognoscenda. Caulis rigidior, elatior, vulgo 1–2-pedalis; foliola raro 3 pollices excedunt, vulgo obtusissima v. retusa, subtus canescentia v. sericeo-villosa. Flores paullo minores. Legumen variat costa longitudinali elevata v. tenui v. (in speciminibus a me olim in herbariis nonnullis sub nomine *C. glycinoides*, DC. in Herb. Mus. Par. distinctis) omnino nulla. Specimina nonnulla Gardneriana utrumque legumen ostendunt in eadem planta.

16. C. DENSIFLORA, herbacea erecta, caule ferrugineo-villosulo, foliolis 3 obovali-oblongis infra glabris subtus sericeo-villosis, pedunculis bifloris in axillis superioribus abbreviatis, bracteis lanceolatis calyce brevioribus, leguminis valvulis costatis.

Neurocarpum densiflorum, Benth. in Ann. Mus. Vind. vol. ii. p. 117.

Hab. In campis fruticetisque Brasiliæ provinciæ Minas Geraes (*Pohl*, *St. Hilaire*, *Weddell*).

Præcedenti affinis sed villosior, foliola magis coriacea latiora, stipulæ et bracteæ majores acuminatæ striatæ, inflorescentia densior.

17. C. STIPULARIS, herbacea erecta, caule piloso, foliolis 3 ovali-ellipticis subtus glaucis tenuiter puberulis, pedunculis plurifloris folio brevioribus, bracteolis lanceolatis membranaceis calyce paullo brevioribus, leguminis valvulis costatis.

Neurocarpum bracteatum, Mart., Benth. in Ann. Mus. Vind. vol. ii. p. 116.

Hab. In sylvis Catingas Brasiliæ provinciæ Bahia (*Martius*).

Caules basi duri, bipedales (v. altiores ?). Stipulæ, bracteæ et bracteolæ membranaceæ, majores quam in præcedentibus. Pedunculi elongati, vulgo 4–6-flori. Flores paulo minores videntur.

Sect. III. CLITORIANTHES.

Frutices erecti v. alte scandentes, ramulis tunc plus minus volubilibus. Folia trifoliolata. Leguminis valvulæ coriaceæ, planæ v. leviter convexæ. Semina matura ignota.

* *Bracteolis angustis v. calyce multo brevioribus.*

18. C. POLYSTACHYA (Benth. Pl. Hartw. p. 60), fruticosa erecta ramosa, foliolis oblongis sublanceolatisve superioribus acutis subtus ramulisque sericeo-pubescentibus, pedunculis multifloris, bracteolis parvis linearibus, leguminis valvulis turgidulis ecostatis.

Hab. In Mexico prope Talea (*Hartweg*), ad San Dionysio in ditione Oaxaca (*Andrieux*, n. 463).

Species quodammodo inter *Neurocarpa* et *Clitorianthes* ambigit, a prioribus caule fruticoso et inflorescentia differt, legumen tamen brevius valvulis convexioribus quam in *Clitorianthis* plerisque.

19. C. BRACHYSTEGIA (Benth. Bot. Sulph. p. 84), fruticosa elata subscandens, foliolis 3 ovatis supra glabris subtus tenuissime puberulis glabrisve, racemis multifloris, bracteolis minimis ovatis, calyce amplo brevi, vexillo pubescente.

Hab. In Peruvia prope Guayaquil (*Sinclair*).

Habitus et folia *C. arborescentis* sed glabrior, et calyx quam in omnibus *Clitoriis* proportione latior, dentibus brevibus late orbicularibus obtusissimis v. vix aculeatis, infima angustiore triangulari. Corolla omnino *C. arborescentis.* Legumen non vidi.

20. C. ARBORESCENS (Ait. Hort. Kew. ed. 2. vol. iv. p. 302), fruticosa elata v. subscandens, foliolis 3 ovatis ellipticisve supra glabris subtus pallide v. rufo-pubescentibus v. sericeo-villosis, racemis multifloris, bracteolis acuminatis calyce multo brevioribus, vexillo pubescente, legumine elongato plano valvulis coriaceis ecostatis.

C. Poitæi, DC. Prod. vol. ii. p. 234. *C. amœna,* Miq. Stirp. Surin. p. 24.

Hab. In America tropica in Surinamo (*Hostmann,* n. 50 et 1097, *Kappler,* n. 1933), in Guiana gallica (*Perrottet*), et anglica (*Anderson, Parker, Rob. Schomburgk,* coll. ii. n. 849, *Rich. Schomburgk,* n. 1331), in ins. Trinitatis (*Lockhart*), St. Vincentii (*Guilding*), et in Panama (*Cuming,* n. 1142, *Sinclair*).

Frutex ab aliis collectoribus elegans dicitur fere arborescens ramis divaricatis diffusisve, ab aliis frutex scandens. Foliola subcoriacea, ampla, maxima usque ad 8 poll. longa, 4 poll. lata, ramealia dimidio minora. Pedunculi folio breviores, a basi pluri- v. multiflori. Flores breviter pedicellati. Bracteolæ vulgo 2–3 lin., interdum 6 lin. longæ, angustæ. Calyx pollicaris, dentibus acutis v. acuminatis. Vexillum bipollicare. Legumen stipitatum, 5–8 poll. longum, 6–9 lin. latum, maturum tamen non vidi.

21. C. SELLOI, fruticosa volubilis, ramulis villosis, foliolis 3 ellipticis v. oblongis acuminatis subtus rufo-sericeis, racemis brevibus multifloris, bracteolis lanceolatis calyce multo brevioribus, vexillo vix pilosulo.

Hab. In Brasilia (media? v. australiore?) (*Sello*).

Affinis *C. arborescenti,* sed rami volubiles, folia et flores minores. Foliola 3–4 poll. longa, 15–18 lin. lata, apice abrupte acuminata. Calyx circa 7 lin. longus laxe pilosus. Corolla vix sesquipollicaris, vexillo dorso medio pilosulo. Legumen non vidi.

22. C. JAVITENSIS, caule lignoso alte scandente v. repente glabro, foliolis 3 ovatis ellipticisve acuminatis glabris v. subtus parce pilosulis, racemis brevibus paucifloris, bracteolis parvis lanceolatis, vexillo puberulo.

Neurocarpum javitense, H. B. K. Nov. Gen. et Sp. Amer. vol. vi. p. 409.

Hab. In Brasilia boreali ad ripas Rio Negro (*Spruce,* n. 1877 et 2320), in ripa flum. Teramini prope Javitam (*Humboldt et Bonpland*), et in Guiana anglica (*Rob. Schomburgk*, coll. ii. n. 1000, *Rich. Schomburgk*, n. 1723).

Species vix satis nota. Specimina *Schomburgkiana* et *Spruceana* incompleta sunt, *Humboldtiani* non nisi fragmenta suppetunt in Herb. Mus. Par. A *C. arborescenti* differt glabritie, ramis tenerioribus, petiolis elongatis, inflorescentia brevi, bracteolis parvis. Flores *C. arborescentis*. Legumen non visum.

23. C. LEPTOSTACHYA, caule lignoso volubili alte scandente glabro, foliolis 3 ellipticis oblongisve acuminatis glabris, racemis elongatis tenuibus, floribus per paria distantibus, bracteis bracteolisque minimis linearibus, vexillo minute puberulo.

Hab. In Guiana anglica ad flumen Corentyn superius prope fines Brasiliensium (*Rob. Schomburgk*, coll. ii. sine num.), et in Surinamo (*Hostmann*) (fide racemo unico absque foliis).

Species inflorescentia distinctissima. Caules sæpe elevato-triquetri faciebus sulcatis, raro teretes. Petioli graciles, 3–8-pollicares. Foliola maxima 7–8 poll. longa, 2 poll. lata, alia dimidio minora, omnia longe et anguste acuminata. Racemi ad axillas solitarii v. ad nodos vetustos fasciculati, nunc 3–4-pollicares nunc pedales, rhachi tenui. Flores in speciminibus *Schomburgkianis* bipollicares, in *Hostmanniano* fere tripollicares.

** *Bracteolis ovatis coriaceis striatis calyces subæquantibus.*

24. C. AMAZONUM (Mart., Benth. in Ann. Mus. Vind. vol. ii. p. 115), caule fruticoso suberecto v. scandente glabro, foliolis 3 ovatis acuminatis glabris v. subtus pilosulis, racemis brevibus ramosis, bracteis pedicello multo brevioribus, bracteolis ovalibus coriaceis calyces subæquantibus, vexillo glabro v. vix minute tomentello.

C. acuminata, Benth. in Ann. Mus. Vind. vol. ii. p. 115.

Hab. In Brasilia boreali in locis sylvaticis fruticetisque ad ripas flum. Solimoes Rio Negro et Amazonum frequens.

Species habitu, foliis, floribus *C. arborescenti* sat similis et pariter variat caule suberecto v. scandente, foliolis majoribus v. minoribus latioribus angustioribusque, sed primo intuitu distinguitur bracteolis 9 lin. longis latis concavis coriaceis striatis apice obtusis v. interdum fissis calyci adpressis. Inflorescentia etiam sæpius ramosa. Legumen *C. arborescentis*, sed omnino maturum non vidi.

25. C. HOFFMANSEGGII, caule fruticoso elato suberecto glabriusculo, racemis petiolisque puberulis, foliolis ex obovato ovatis ellipticisve obtusis v. subacuminatis, racemis brevibus ramosis, bracteis ovatis pedicellum subæquantibus, bracteolis ovalibus coriaceis calyces subæquantibus, vexillo sericeo-pubescente v. villoso.

C. arborea, Benth. in Ann. Mus. Vind. vol. ii. p. 115 (non *C. arborescens*, Ait.).

Hab. In Brasilia boreali ad Para (*Siber in Herb. Mart.*), ad Rio Ma-

dura (*Herb. Mus. Petrop.*), et in Peruvia cisandina prope Mozobamba et Tarapoto (*Matthews*).

Species non satis nota *C. amazonum* valde affinis et forte ejus varietas. Differre videtur caule (ex *Siber* et *Matthews*) altiore arborescente, pube, bracteis majoribus numerosis plerisque 4 lin. longis, calyce paullo breviore, vexillo villosiore.

26. C. RACEMOSA (Benth. in Ann. Mus. Vind. vol. ii. p. 115), caule fruticoso glabriusculo, foliolis ovatis ellipticisve acuminatis coriaceis glabris v. subtus pubescentibus, racemis dense multifloris, bracteis pedicello vix brevioribus, bracteolis ovalibus coriaceis calycem subæquantibus, vexillo sericeo-pubescente v. villoso.

Hab. In Brasiliæ prov. Goyaz prope Natividade (*Pohl*).

Frutex v. arbor ramis diffusis *C. amazonum* affinis. Foliola magis coriacea, venis primariis parallelis crebrioribus. Racemi vulgo folia æquant v. superant, nunc fere pedales, a medio ad apicem dense floridi, bracteis numerosis 2–3 lin. longis. Flores *C. amazonum*, sed bracteolæ et calyces tenuiter tomentelli et vexillum molliter sericeum.

Supersunt species duæ a G. Don in ins. St. Thomæ lectæ, *C. racemosa* et *C. alba*, ejusd. Gard. Dict. vol. ii. p. 213, verosimiliter vel ad *C. glycinoiden* referendæ vel e genere excludendæ.

On the Cultivation of Mosses. By the Rev. H. H. HIGGINS. Communicated by N. B. WARD, Esq., F.L.S.

[Read February 3rd, 1857.]

I SEND a few particulars respecting the cultivation of Mosses, of which about two hundred and forty species have been planted in my bryarium, which is a glass case about 4 feet 6 inches long, 22 inches from back to front, and 26 inches in height. It is fitted with shelves, and has two doors, one of which is generally left only partially closed. The plants are in separate pots, and are never removed from the case, but are kept in the shade and frequently watered with a syringe. Care is taken to procure suitable kinds of soil; but in most instances the soil is sparingly used, the pots being more than half filled with drainage.

ANDREACEÆ.—*A. rupestris* flourished and fruited till the second season. If removed with a portion of the rock attached, it might last much longer.

SPHAGNACEÆ.—The pots were set in trays of water, and no soil was put into them. Six species, five of them in fruit, were planted, and did well for the first year. *S. acutiflorum* alone fruited the second year. They are now almost extinct.

PHASCEÆ.—From a fine patch of *P. nitidum* only one or two plants came up the second year.

WEISSIEÆ.—Seem permanent. *W. controversa* fruits profusely about a month before its usual time.

DICRANEÆ.—*Stylostegium cæspititium* from Ben Lawers soon perished. *Dicranum polycarpum* and *D. virens*, from the same locality, flourish; the former fruits vigorously. Eight other species, some of them Alpine, seem permanently established. *Leucobryum glaucum* does not alter in the least.

CAMPYLOPODEÆ.—*C. longipilus*, from Scotland, thrives; and the common species bears fruit.

POTTIEÆ.—*P. Heimii* dies rapidly. *P. truncata* fruits.

TRICHOSTOMEÆ.—*Tri. tophaceum* and *homomallum* disappear. The *Tortulæ* mostly do well, but the case contains no Alpine species. *T. ruralis* overgrows itself and dies.

ENCALYPTEÆ.—*E. vulgaris* fruited and disappeared. *E. ciliata* remains, but is barren. Two Alpine species from Ben Lawers are unhealthy.

HEDWIGIEÆ.—*H. ciliata* remains, but wants attention.

GRIMMIEÆ.—*G. pulvinata* is a charming little plant for cultivation, but must be kept rather dry. Several others do fairly. All the *Racomitria*, except two, flourish and are very ornamental.

ORTHOTRICHEÆ. — Tied upon small blocks of wood, and suspended, they live, and some of them bear fruit, but do not appear thoroughly healthy. *Zygodon Lapponicus* and *Z. Mougeotii* are on the wane. *Tetraphis pellucida* holds its own well, but does not fruit.

POLYTRICHEÆ.—*Pogonatum nanum* is gone. *P. aloides* and *P. urnigerum* grow, and fruit beautifully: even *P. alpinum* does better than many. The *Polytricha* have not succeeded well.

BRYEÆ.—*Aulacomnium palustre* is most desirable for cultivation; it grows freely, and the tall pseudopodia have been abundant and very interesting. *Leptobryum pyriforme* should be excluded if possible; it becomes a perfect pest, growing everywhere but in its own pot. *Bryum*: about twenty-four species of this genus grow in the case; the best are *B. nutans* and *carneum*, both of them very beautiful in fruit. *B. alpinum* retains its fine crimson colour. *B. julaceum* and *B. Zierii* both do well, whilst the common *B. argenteum* has been often changed, and is now given up. *B. roseum* has been disturbed a good deal, ♂ and ♀ specimens having been planted together to try if fruit would be produced; but as yet there is no appearance of fertility. *B. Marratii*, *B. calophyllum*, and *B. Warneum* are not healthy. *Mnium*: all that have been tried do well.

MEESIEÆ.—*Meesia uliginosa* puts forth setæ of prodigious length; a rather suspicious circumstance in respect of its congener *M. longiseta.*

FUNARIEÆ.—*Physcomitrium pyriforme.* The fruit in its season is so dense that not a leaf can be seen.

BARTRAMIEÆ.—*Bartramia.* All are included except *B. rigida. The best and most satisfactory* mosses for growing in cultivation. Nothing of the kind can exceed them in beauty of colour, growth, and fruit. *Catoscopium nigritum* is gone.

SPLACHNEÆ.—*S. ampullaceum* and *S. sphæricum* have been only lately received; but *Tetraplodon mnioides*, on the bones of a rabbit, has grown and fruited for two seasons most vigorously.

FISSIDENTEÆ are gems for cultivation. *F. adiantoides* is a portion of a specimen which has been in cultivation for twenty years. *Antitrichia curtipendula* is not healthy.

ISOTHECIEÆ.—The *Pterogonia* are weakly. The *Isothecia* flourish. *Climacium dendroides* has been very fine, but now droops. *Leskea sericea* and *L. polycarpa* are very beautiful. *L. latebricola* and *pulvinata* are fast disappearing.

HYPNEÆ.—Of *Hypnum* sixty species are included. They are not easily kept in order on account of their straggling habit. The vitality of the plant seems to leave the root and the centre, and to reside almost entirely in the extremities. If these be cut off, the plant will not throw up fresh shoots from the root, but perishes. In some instances I have therefore cut off and planted in fresh and suitable soil the extremities of the fronds; and these have made young and vigorous specimens. The experiment is however too recent to be considered conclusive. Many of the rare Alpine species have been tried, but most of them are in a sickly state. *H. Crista-Castrensis* seems to thrive, but does not form so handsome a plant as *H. uncinatum*. *H. loreum* becomes in appearance exactly like *H. squarrosum*. *H. atro-virens*, from Ben Lawers, is very beautiful. No *Hypna* fruit with me but those which are commonly found fertile; *H. cordifolium* is perhaps an exception.

OMALIÆ.—*O. trichomanoides* is healthy. *Neckera crispa* is tied to a flat stone and suspended; it is in a very satisfactory condition.

Hookerieæ.—*H. lucens* never changes: in winter and summer it is alike beautiful. It is now fruiting pretty freely.

Fontinaleæ.—*F. antipyretica* fails.

Hepaticæ.—*Riccia fluitans* grows in a very interesting way. *Targionia hypophylla* is gone. The *Marchantiæ* grow too freely. *Jungermanniæ*: I have had twenty-seven species; some of them, e. g. *J. tomentella, J. ciliaris, J. spinulosa* and *J. asplenoides*, are as beautiful as any plants in the case. Some of the species fruit profusely, pouring out a stream of silvery translucent fruit-stalks, tipped with little shining ebony heads, which, when expanded, show very remarkable hygrometric properties. *J. nemoralis* is covered with little dark-coloured gemmæ.

Bartramia Halleriana grew last autumn with a fringe of *Hymenophyllum*, with which it was collected near Loch Lomond, and was as round and as finely in fruit as a bush of Mistletoe.

On the Structure of the Seeds of *Barringtonia* and *Careya*. By Thomas Thomson, Esq., M.D., F.R.S., F.L.S., Superintendent of the Calcutta Botanical Garden.

[Read March 17, 1857.]

The internal structure of the seeds of *Barringtonia* and *Careya* has long been a matter of doubt, and indeed continues to the present day to be described by different authors very differently, being by some regarded as exalbuminous, while others represent the embryo as lying in the axis of copious albumen.

The genus *Barringtonia* originated with Forster, but two of its species were known to Linnæus, and referred by him to the genera *Mammea* and *Eugenia* respectively. The descriptions of Linnæus, Forster and Lamarck do not refer to the internal structure; but as Jussieu* refers the genus to *Myrtaceæ*, an order which he describes as exalbuminous, he seems to imply a similar structure in *Barringtonia*.

Gærtner† (1791) describes *Barringtonia* as albuminous, but adds that the albumen adheres firmly to the entirely undivided embryo in which cotyledons and radicle are undistinguishable.

* Genera, p. 326.

† Sem. ii. 97.

In 1826, Blume[*], without noticing Gærtner's description, ascribes to *Barringtonia* an exalbuminous seed, with a rugose undivided or pseudomonocotyledonous embryo. DeCandolle[†] in 1828 adopted the same view, but his description of the seed seems derived chiefly if not entirely from Blume.

The genus *Careya* was published for the first time by Roxburgh in 1819 in the third volume of the 'Coromandel Plants.' As the library of the Calcutta Garden does not contain a complete copy of this work, I have not at present access to Roxburgh's figure; but as the letter-press does not refer to the structure of the seed, it is probably not represented in the plate.

The earliest published account of the seed of *Careya* is that of Buchanan Hamilton[‡], in his commentary on the '*Hortus Malabaricus*' of Rheede, which appeared in 1827. He describes it as undoubtedly albuminous, with a straight terete central embryo, subacute at both ends, and as long as the albumen.

The second volume of Roxburgh's 'Flora Indica,' published in 1832, contains a detailed account of that botanist's observations on the seeds of both genera. In *Barringtonia*[§] he describes a copious albumen, with a simple embryo (without cotyledons) of the same length situated in its axis. He adds, however, several details, which seem to show that he considered the structure obscure and anomalous. In particular he tells us that the embryo forms the ligneous centre of the shoots, or, as he says a little lower down, the wood and pith, while the perisperm furnishes the cortical part and the leaves.

The seed of *Careya*[‖] is described almost in the same terms as that of *Barringtonia*,—with a simple embryo as long as the copious albumen; and it is again stated that the embryo furnishes the centre or ligneous part, and the perisperm the cortical part of the young plant. It is added that the radicle issues from the small end of the seed close to the umbilicus, and the scaly plumule from the opposite end, a structure identical with that indicated as existing in *Barringtonia*, in which the solitary seed is pendulous, and the root is developed from the apex of the fruit; or in modern botanical terms, the radicle is next the hilum and the seed anatropous.

In 1834 Wight and Arnott[¶] describe the seeds of both genera as exalbuminous, with the large embryo not separable into cotyledons and radicle, but formed of two concentric homogeneous combined layers. As these authors possessed no ripe seeds, this character is an inference from a careful comparison of Gærtner's figure and description with the descriptions of Roxburgh and Blume, and perhaps with Roxburgh's drawing in the India House. As the result of this comparison, they state that they have no doubt that the structure in both genera is identical, and that the supposed albumen is part of the embryo, while no real albumen exists.

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[*] Bijd. 1096.
[†] Prodr. iii. 288.
[‡] Linn. Trans. xv. 96.
[§] Fl. Ind. ii. 635.
[‖] Fl. Ind. ii. 638.
[¶] Prodr. Fl. Ind. p. 334.

In 1839–40 Endlicher ('Genera Plantarum') ascribes to both genera an exalbuminous embryo united with the cotyledons into a homogeneous fleshy mass, and makes no allusion to the double layer clearly indicated in Gærtner's figure, and described by Roxburgh and Wight and Arnott.

In 1841 Wight, returning to the subject in the second volume of the 'Illustrations*,' abandons the views which are given by Arnott and himself in the 'Prodromus,' and says that Roxburgh correctly describes the seed as having a simple inverse embryo the length of the ample perisperm.

In 1853 Lindley†, following Hamilton, Roxburgh and Wight, ascribes to the tribe *Barringtonieæ* an embryo in the axis of copious fleshy albumen.

Griffith's excellent observations on these anomalous seeds were not published till 1854‡, and consist only of the rough notes attached to the drawings; the subject, though too important to be entirely neglected by so indefatigable an observer, having only come before him cursorily, so that the notes made at one time are somewhat at variance with those at another. His remarks are so important that I shall quote them at length. At page 657 of the work quoted he says, "The seed of *Barringtonia* is sufficiently remarkable: I imagine the central part represents above the radicle, below the plumule; and I also imagine that all the part between the lowest scales of the superficies and the radicle is adherent cotyledon. Or is it an instance of an immense radicle and two or several minute cotyledons (represented by scales and an inconspicuous plumule)? To this, which is suggested by the radicular central system being internal, not reaching the superficies, there is a great objection in the irregularity, in number and situation, of the scales. The internality may arise from the cotyledons being produced into basilar auriculæ, concealing and enclosing the roots, as occasionally happens. The development only will clear up the point, for even if the scales become enlarged and foliaceous during germination, they will not, I think, necessarily become plumulary, some cotyledons during germination becoming decidedly leafy. On the whole this peculiar embryo appears to me distinctly analogous to that of *Dracontium*, and in a less degree to that of *Cryptocoryne*."

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* p. 19. t. 100. † Veg. Kingd. 754. ‡ Notulæ, vol. iv.

In the illustrations to the fourth volume of Griffith's 'Notulæ,' t. 636. f. 1 represents a longitudinal section of a ripe seed of *Barringtonia conoidea*, Griff., and in the description of the plates he refers to a central and peripherical system, at the plumular end of the latter of which two small notches are seen. Fig. 2 of the same plate shows a similar section of *B. racemosa*, and shows at *b, b* the primary or first-formed scales, and at *c, c* the secondary-formed scales.

In plate 634 A the four figures in the left upper corner represent longitudinal sections of the seed of *Careya herbacea*, Roxb. The references to the letters are found in the 'Notulæ*.' In the general description of the plant he gives it white fleshy albumen and an undivided central embryo united to the albumen. In the references, however, he has evidently in view the above-quoted general remarks on *Barringtonia*, calling the notches at the plumular end of the peripherical system cotyledons, and adding above, "at first the long section shows only two notches, then it shows four, the two last nearly enclosing the plumule†."

In 1855 Miquel‡, following Blume and Endlicher, gives to both genera an exalbuminous embryo, in which cotyledons and embryo are blended into a homogeneous mass.

From the preceding details it will be seen that Gærtner, Blume, Hamilton, Roxburgh, Wight, and Griffith are the original authorities, from whom all systematists have copied, and that there are three distinct modes in which the structure has been viewed:—

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* iv. 661.

† An earlier view taken by Griffith, in reference to the seed of *Careya*, is given in the abstract of a paper by him, dated July 1st, 1835, and published in the 'Proceedings of the Linnean Society,' vol. i. pp. 280–1. In this abstract, after describing both the seed and its germination, it is said:—"The absolute nature of the outer fleshy part, Mr. Griffith observes, can only be determined by pursuing the development of the ovule. The nature of the subulate body is evident: it is the root, the true plumula being the minute scaly body at its distal end. The root points, as it should do, towards one side of the hilum, the situation in fact of the foramen. At the collet it is continuous with the plumula, and laterally with the outer fleshy mass, which ought therefore to be cotyledonary, and taking it to be so, might be explained by supposing the cotyledons to be affixed in a peltate manner, and united into a solid mass." There is little essential difference between this view and that proposed by Blume and adopted by DeCandolle and Endlicher, in regard to *Barringtonia*.—SECR.

‡ Fl. Ned. Ind. i. 484.

1. As an undivided exalbuminous embryo, which is the statement of Blume, followed by Endlicher and Meisner.

2. As an embryo in the axis of copious albumen. This view originated with Gærtner, and was adopted by Hamilton, Roxburgh, Wight, and Lindley.

3. As an exalbuminous embryo in two layers, a view first promulgated by Wight and Arnott, and doubtfully adopted by Griffith.

The manifest contradiction involved in these different modes of describing the same parts in a seed of considerable size induced me to take the first opportunity of examining ripe and germinating seeds. This I have now been able to do for two seasons in the Calcutta Botanic Garden, and the structure is so simple, that it will require much less time to describe it than has been occupied in the enumeration of the views of previous observers.

An inspection of the ripe seed of *Barringtonia* or *Careya* shows at once that it is not perfectly homogeneous. A transverse section of any part of the seed presents, as in Gærtner's plate of *Barringtonia* and Wight's of *Careya*, two concentric layers, separated by a ring of darker-coloured tissue, which has an organic connexion with both layers. A longitudinal section, as is shown in Gærtner's, Wight's, and Lindley's plates, as well as in those of Griffith, exhibits the central body extending throughout the whole length of the seed, and surrounded by the supposed albumen, from which it is separated on either side by a narrow line of darker-coloured tissue. The shape of the central body is dependent on the shape of the seed, and therefore varies in different species of the two genera; but the relative position of the parts remains the same in all.

The microscope shows that both of these bodies consist of ordinary cellular tissue full of starch-granules; but that the separating layer, which is in organic connexion with both, consists of a very thin or almost single layer of delicate wood-cells (pleurenchyma) intermixed with barred and true (unrollable) spiral vessels.

The integuments of the seed are readily separable in *Careya*; they adhere somewhat firmly both to the fruit and the seed in *Barringtonia*, but can be detached with a little care from the embryo, most easily near the plumule. An examination of the surface of the embryo before germination shows that, except two minute and scarcely perceptible notches, first noticed by Griffith, at the extremity from which the stem is afterwards developed, the surface is perfectly uniform.

Roxburgh's MSS. drawings in the library of the Calcutta Botanic Garden contain excellent figures of the germinating seeds of *Careya arborea* and *Barringtonia racemosa.* My examination of the germination of *Careya* has confirmed Roxburgh's observations, and I found that, allowing for difference of size and shape, the germination of *Barringtonia acutangula*, the species I examined, is exactly like that of *B. racemosa*, as figured by Roxburgh.

In all, the only appearances of foliar organs are a few minute scales surrounding the growing point, which is gradually elongated into the ascending axis. On this axis the earlier leaves are quite rudimentary, and true leaves are not developed till it has become one or two inches long.

A longitudinal section of a germinating plant shows that the central body is continuous with the pith, and the superficial body with the bark, as Roxburgh has long ago stated. It further shows that the vascular layer, which separates the two, is continuous both upwards and downwards with the ligneo-vascular cylinder of the stem and root.

It is thus evident: 1. That the embryo of *Barringtonieæ* is exalbuminous. 2. That the cotyledons are rudimentary. 3. That the embryo is an axial organ, consisting of pith, woody layer, and bark. 4. That the plumule, at best almost without scales, is developed into a stem, while the opposite extremity elongates into a root.

In examining nearly a hundred germinating plants of *Careya arborea*, I found that in a considerable number (eight or ten instances) the primary axis died off, and the stem was continued by a bud springing from the axil of one of the minute scales. In one instance this took place so close to the embryo as to be apparently in the axil of one of the first pair of scales, or rudimentary cotyledons.

In describing the seeds of *Garcinia* and *Xanthochymus*, Roxburgh states that their structure is quite like that of the seeds of *Careya* and *Barringtonia*, except that the central portion (which he calls the embryo) is very slender, and that the permanent root proceeds from the base of the plumule, while that from the opposite end of the embryo soon perishes, or remains slender as compared with the other.

Such adventitious roots are of common occurrence also in *Careya*, so that the difference is even less than Roxburgh supposed. Circumstances prevented my examining germinating seeds of *Xanthochymus*, grown here for the purpose last year, but I hope to be able to do so before the end of the present season.

EXPLANATION OF PLATE I. A.

Fig. 1. Germinating plant of *Careya arborea*, Roxb.
Fig. 2. Another plant of the same, with the seed cut longitudinally.
Fig. 3. Germinating seed of *Barringtonia racemosa*, Blume, after Dr. Roxburgh's drawing.

Note on some young plants of *Cardamine hirsuta*, growing from buds formed on the upper surface of old leaves of that plant, exhibited March 3rd and 17th, 1857. By Miss LLEWELYN of Penllergare, near Swansea. Extracted from a Letter to G. BENTHAM, Esq., F.L.S.

[Read March 17th, 1857.]

IN January 1857 I observed a number of small leaves strewn about on a flower-bed, some green and some purple; on examining them I found that they were all growing by means of small, white fibrous roots—protruded in several places from the upper surface of the leaf, which is usually turned down on the earth. In many instances young leaf-stalks and small leaves were formed, all attached to the parent leaf, which appears to be that of *Cardamine hirsuta*, L.

A large plant of this weed was destroyed in the same bed, in September 1856, when leaves were broken off and accidentally scattered around.

Since January I have observed many instances of the same leaf-plants in other parts of the garden; and in one other instance I can trace the young weeds to the same cause.

Penllergare, March 3rd, 1857.

Memorandum by George Bentham, Esq.

These very curious specimens appeared mostly to be the larger, and especially the terminal, segments of the leaves of *Cardamine hirsuta*, and the young plants were generally growing from the upper surface close to the junction with the petiole, with here and there a few tufts of roots from other parts of the surface; but in some specimens there were two or three young plants growing from scattered points on the surface of the segment.

Præcursores ad Floram Indicam. By J. D. HOOKER, Esq., M.D., F.R.S. & L.S., and T. THOMSON, Esq., M.D., F.R.S. & L.S.

(Continued from page 29.)

SERIES II. SAXIFRAGEÆ (including *Hydrangeæ*, &c.), CRASSULACEÆ, DROSERACEÆ, PARNASSIEÆ, GROSSULARIEÆ, HAMAMELIDEÆ, and PHILADELPHEÆ.

THE Orders here grouped together appear to us to stand in more immediate connexion with one another than with any other Indian Orders, and to be intimately connected with *Corneæ* and its allies on the one hand, and *Rosaceæ* on the other. From *Corneæ* and its allies they differ much in the structure and number of their ovules, which are numerous, except in some *Hamamelideæ*, and in their less constant characters of the carpels being partially free from one another and from the calyx or apex of the peduncle, the rarely valvate floral envelopes, and the more numerous stamens. From *Rosaceæ* they are less definitely though more naturally separated, and the Himalayan genera *Neillia* and *Astilbe* form a very close connecting link between these Orders. Of these, *Neillia* may safely be referred to *Saxifrageæ*; and *Astilbe* must, technically, fall into *Saxifrageæ* also, though its relationship to *Spiræa* is all but generic. *Polyosma,* appended by Brown and Bennett to *Escallonieæ,* presents the strongest resemblance to *Corneæ* in many respects.

We have endeavoured to give a conspectus of these Orders, with their diagnostic characters drawn from the Indian genera, from which it will be seen, that though all of them are very natural groups, they are to a great extent undistinguishable by characters. *Saxifrageæ*, by being made to include the fruticose genera *Adamia, Hydrangea, Itea,* and *Polyosma,* has a very different value from the succeeding Orders, which are all of them as naturally parts of *Saxifrageæ* as many of the genera included under it are. *Philadelpheæ* might without violence be brought next to *Hydrangea*; *Parnassia,* though exalbuminous, is nearly related to *Saxifraga* itself, as indicated by Brown and others, and displays the same singular economy of the stamens advancing by pairs to the stigmata, the same texture of its persistent petals, and a habit so similar, that when in the Himalaya, their close affinity appeared to us self-evident. *Hamamelideæ* might be brought under *Cunoniæ,* the remarkable stipules of *Bucklandia* finding an exact homologue in *Cunonia* itself, whilst amongst other genera of both Orders many cross affinities may be traced. *Droseraceæ* and *Grossularieæ* seem to us to be rather aberrant members of *Saxifrageæ* in its extended significance, than separate Orders; the former having many points in common with *Saxifrageæ*, as the persistent marcescent subperigynous petals, which, and the stamens, are absolutely perigynous in some Antarctic species, indicating, as it appears to us, stronger affinities with this group than M. Planchon admits in his able paper on the genus*. It is not, however, our intention to discuss such questions at length in the "Præcursores;" and we therefore proceed with the systematic arrangement of the genera and species.

DIAGNOSES ORDINUM AD GENERA INDICA RECENSENDÆ.

I. SAXIFRAGEÆ. *Calyx* superus v. inferus. *Petala* valvata v. imbricata. *Stamina* 4–20, epigyna v. perigyna. *Ovarium* 1–10-loculare, stylis connatis v. distinctis. *Fructus* capsularis v. baccatus, 1–10-locularis, placentis axillaribus, suturalibus, parietalibusve. *Semina* albuminosa.—Habitus, folia *et* inflorescentia *varia.*

II. PARNASSIEÆ. *Calyx* semi-superus v. inferus. *Petala* 4–5, imbricata. *Stamina* 4–5, perigyna, staminodiis alternantia. *Ovarium* 1-loculare, placentis 3, parietalibus; *stylis* 3, v. 1, trilobo. *Capsula* coriacea. *Semina* exalbuminosa.—Herbæ *glaberrimæ, temperatæ*; foliis *radicalibus*; scapis *foliatis, 1-floris*; floribus *hermaphroditis.*

III. DROSEREÆ. *Calyx* inferus, 5-lobus, v. 5-partitus. *Petala* 5, subhypogyna, imbricata. *Stamina* 5, subhypogyna. *Ovarium* 5-loculare, placentis 3–5 parietalibus; *stylis* 3–5. *Capsula* 3–5-valvis, valvis medio placentiferis. *Semina* albuminosa.—Herbæ *temperatæ et tropicæ, pleræque glanduloso-pilosæ*; foliis *omnibus radicalibus circinatis*; scapis *ebracteatis*; floribus *racemosis, hermaphroditis.*—Habitus, &c. *Aldrovandræ* peculiaris.

IV. GROSSULARIEÆ. *Calyx* superus, tubo supra ovarium producto, 4–5-fido. *Petala* 4–5, fauce calycis inserta, parva, imbricata. *Stamina* 4–5, cum petalis inserta. *Ovarium* 1-loculare, placentis 2–4 parietalibus v. semiseptis adnatis; *stylis* 2–4, distinctis. *Bacca* pulposa. *Semina* albuminosa.—Frutices *temperatæ, sæpius glandulosæ*; foliis *alternis, vernatione plicatis*; floribus *racemosis subsolitariisve, hermaphroditis v. polygamo-dioicis.*

V. HAMAMELIDEÆ. *Calyx* semi-superus, lobis 5–7. *Petala* 4–5 v. 0, calyce inserta, sæpius ligulata, imbricata v. basi valvata. *Stamina* 5 v. plura, calyce inserta. *Ovarium* biloculare, ovulis 1

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* Ann. Sci. Nat. sér. 3. vol. ix. p. 90.

v. numerosis, placentis axillaribus adnatis; *stylis* 2. *Capsula* bipartibilis v. bifida, epicarpio soluto. *Semina* albuminosa.—Frutices *v.* arbores *temperatæ et subtropicæ*; pilis *plerisque stellatis*; foliis *alternis, stipulatis*; floribus *racemosis v. capitatis, calycibus interdum coadunatis, hermaphroditis v. unisexualibus.*

VI. PHILADELPHEÆ. *Calyx* superus, 4–5-fidus, lobis valvatis. *Petala* 4–5 disco epigyno inserta, convoluta v. valvatim induplicativa. *Stamina* 10 v. plura, cum petalis inserta, filamentis planis. *Ovarium* 3–10-loculare, placentis angulo centrali adnatis; ovulis numerosis; *stylis* 3–5, filiformibus, liberis v. connatis. *Capsula* vertice septicide v. loculicide dehiscens. *Semina* albuminosa; testa membranacea, laxa, ultra nucleum producta.—Frutices *temperatæ*; pilis *dum adsunt sæpe stellatis*; foliis *oppositis, exstipulatis*; floribus *albis, trichotome cymosis v. paniculatis, hermaphroditis.*

VII. CRASSULACEÆ. *Calyx* liber 3–20-partitus, lobis imbricatis persistentibus. *Petala* totidem perigyna, imbricata v. valvata, libera v. gamopetala. *Stamina* 6–20 cum petalis inserta v. iis adnata. *Squamulæ hypogynæ* tot quot ovaria, iis oppositæ, rarius 0. *Ovaria* tot quot petala et iis opposita, verticillata, libera v. rarius syncarpa, 1-locularia, placentis marginalibus. *Capsulæ* folliculares, liberæ. *Semina* minima, scobiformia, albumine tenuissimo v. 0.—Herbæ *carnosæ*; caule *v.* rhizomate *interdum lignoso*; foliis *oppositis alternisve, exstipulatis, interdum compositis*; floribus *hermaphroditis, rarius unisexualibus, plerisque cymosis racemosisve.*

I. SAXIFRAGEÆ.—DIAGNOSES GENERUM.

A. HERBACEÆ.

1. SAXIFRAGA, *L.* *Calyx* liber v. basi ovarii adnatus, sepalis imbricatis. *Petala* 4–5, perigyna. *Stamina* 10, perigyna. *Ovarium* 2–3-loculare; *stylis* 2–3, liberis.—Herbæ *temperatæ et alpinæ pleræque cæspitosæ*; foliis *alternis, exstipulatis.*

2. VAHLIA, *Thunb.* *Calyx* ovario adnatus; lobis valvatis. *Petala* et *stamina* 5, epigyna. *Ovarium* 1-loculare, placentis geminis pendulis; *stylis* 2.—Herbæ *tropicæ*; foliis *oppositis, exstipulatis.*

3. CHRYSOSPLENIUM, *L.* *Calyx* ovario adnatus, 4–5-fidus. *Petala* 0. *Stamina* 8–10, disco epigyno inserta. *Ovarium* 1-loculare, placentis 2, prope basin ovarii insertis; *stylis* 2.—Herbæ *temperatæ et alpinæ*; foliis *oppositis alternisque, exstipulatis.*

4. TIARELLA, *L.* *Calyx* campanulatus, basi imo ovarii adnatus; lobis 5, valvatis. *Petala* 5, perigyna. *Stamina* 10, perigyna. *Ovarium* biloculare, placentis basi dissepimenti adnatis; *stylis* 2. —Herba *temperata*; foliis *plerisque radicalibus.*

5. ASTILBE, *Ham.* *Calyx* basi ovario adnatus, lobis imbricatis. *Petala* 4–5, perigyna, v. 0. *Stamina* 8–10, perigyna. *Ovaria* 2, libera; placentis suturalibus.—Herbæ *elatæ*; foliis *alternis, compositis, stipulatis.*

B. FRUTICES V. ARBORES.

6. NEILLIA, *Don.* *Calyx* basi ovario adnatus, lobis 5, valvatis. *Petala* 5, perigyna. *Stamina* numerosa, perigyna. *Ovarium* 1, 1-loculare; placenta suturali.—Frutices *temperatæ*; foliis *alternis, stipulatis, lobatis.*

7. HYDRANGEA, *L.* *Calyx* superus, floribus sterilibus petaloideus, fertilibus 4–5-dentatus. *Petala* epigyna, valvata. *Stamina* 8–10, epigyna. *Ovarium* inferum 2-loculare; placentis dissepimenti marginibus adnatis; *stylis* 2. *Fructus* capsularis.—Frutices *v.* arbores *temperatæ*; foliis *oppositis, exstipulatis.*

8. ADAMIA, *Wall.* *Calyx* superus, 5-dentatus, sinubus latis. *Petala* 5, epigyna, sessilia, valvata. *Stamina* 10, epigyna. *Ovarium* incomplete 3–5-loculare, placentis semiseptorum marginibus adnatis; stylis 3–5. *Bacca* 1-locularis; placentis 3–5 parietalibus.—Frutex *temperata*; foliis *oppositis, simplicibus, serratis.*

9. POLYOSMA, *Blume.* *Calyx* superus, 5-lobus. *Petala* 4, epigyna, linearia, valvata. *Stamina* 4, epigyna. *Ovarium* 1-loculare, placentis 2 parietalibus; *stylo* elongato; *stigmate* simplici. *Bacca* monosperma.—Arbores et frutices *tropicæ*; foliis *oppositis, exstipulatis.*

10. ITEA, *L.* *Calyx* inferus, campanulatus, 5-fidus. *Petala* 5, perigyna, valvata. *Stamina* 5, perigyna. *Ovarium* 2-loculare, placentis juxta medium dissepimenti utrinque biseriatis; *stylo* simplici demum bipartibili. *Capsula* bipartibilis.—Arbores *subtropicæ*; foliis *alternis, exstipulatis.*

11. PILEOSTEGIA (*H. f. & T.*). *Calyx* semisuperus, obconicus, 4–5-lobus. *Petala* 4–5 calyce inserta, valvata, calyptratim subcohærentia. *Stamina* 8–10 cum petalis inserta. *Ovarium* 5-loculare; ovulis numerosis elongatis, ex apice loculi pendulis; *stylo* crasso clavato, stigmate 5–6-sulcato truncato apice 5–6-lobo, ad angulos lineis 5–6 longitudinalibus stigmatiferis instructo.

Fructus?—Arbor *v.* frutex *ramulis subteretibus*; foliis *oppositis, exstipulatis, coriaceis*; inflorescentia *terminali cymoso-paniculata, ramis decussatim oppositis*; floribus *pedicellatis, subfasciculatis.*

1. SAXIFRAGA, *L.*

With the solitary exception of *S. ligulata*, which is found also in the Khasia Mountains, all the Indian species are natives of the temperate and alpine regions of the Himalaya and Tibet, affecting precisely similar situations to what they do in Europe and the Arctic regions; and several of the species, as *S. hemisphærica, imbricata, saginoides*, and *Jacquemontiana*, attain the extremest limit in altitude of vegetation. The number of species seems to increase in the Eastern Himalaya, 28 being found to the eastward of Central Nipal, and only 24 to the westward of that meridian, of which latter several are not found west of Kumaon, whilst the unexplored Eastern alpine regions of Bhotan, Abor, &c. may be expected to yield many novelties. Of the Himalayan species we have referred seven to European ones, with tolerable confidence; they are, *S. flagellaris, granulata, cernua, Sibirica, orientalis, oppositifolia*, and *Hirculus*, of which all but the first and last are exclusively Western Himalayan. The remainder, with the exception of *S. ramulosa*, which approaches *S. cæsia* and *aretioides*, and *S. ciliata*, which is closely allied to the Siberian *S. crassifolia*, are all very distinct from the species of other countries.

The following synopsis of the Indian Saxifrages requires a little prefacing. We do not offer it as being at all likely to be uninfluenced as to its results by future discoveries. Saxifrages are more numerous in species and as frequent in individuals, in the Himalaya as in the Alps and Pyrenees, and analogous differences in opinion as to what should be considered distinct types amongst these, will be encountered by Indian botanists, when the suites of Himalayan specimens are as copious and accessible as the European are. It is true that the most puzzling group of all, the divided-leaved *Dactyloides*, does not perhaps exist in the Himalaya, but it is compensated for by the number and abundance of the *Hirculus* section, which is apparently scarcely less variable. Our materials have been three different times very carefully studied, at distant intervals; and the results of the second and third examinations have led to almost identical conclusions as to the number and limits of the forms. These limits are no doubt in some cases artificially drawn; the absence of connecting links in our collections, the deficiency of specimens in different stages of development, and from different conditions of soil, climate, &c., the oversight of minute but permanent and natural characters, and the over-estimate of more conspicuous but less constant unimportant ones, are, after all, though the common, not the only, or in all cases the most numerous causes of diversity of opinion as to specific limits in such a genus. The subtler sources of error are, preconceived notions originating with the circumstances under which the specimens are first brought before us, alive or dried, and dominant ideas founded upon a previous study of the genus in other parts of the world. In short, all the advantages which a skilled naturalist derives from familiarity with his subject under other phases—from a full knowledge of the labours of others, and from having himself studied the majority of his materials in their native localities—have concealed within them certain sources of errors in judgement which influence the results of the closest observer and most skilful reasoner.

Such being the case, we feel that something is required of us beyond the simple assurance that we have given a more than average amount of careful comparative and microscopic study to so difficult a genus; we have, in the next place, well compared our forms with the identical, analogous, and representative species of Siberia, Europe, and North America; and we have collected almost all our Scotch Saxifrages, and studied those of the Alps a little in their native localities. We have carefully examined numerous specimens from almost all Indian collectors, and 35 out of the 39 species have been gathered by one or both of us, many of them in numerous localities. Having upon these data formed an approximate estimate of the limits of the Himalayan forms, and found that they allowed much latitude for difference of opinion as to a very considerable proportion of the species, we sought some European standard work with the views of which our Indian results might on the whole accord; and have selected Koch's 'Flora Germanica,' as being that which best represents our ideas of the limits of the European forms. Whether all these forms of European or Indian Saxifrages are to be considered specific, is quite another question, and one which we cannot solve; all we can do with propriety is to indicate what seem most marked, and what least so.

To put this matter in a practical form, we may say, that if we carried out what appears to us the most extreme views that could possibly be adopted towards uniting forms, we should reduce the Indian Saxifrages to 26, by uniting as varieties, the three of the

Bergenia group; *ramulosa* and *imbricata*; *granulata*, *cernua*, and *odontophylla*, with possibly *Sibirica*; *stenophylla* and *flagellaris*; *brachypoda* and *fimbriata*; *palpebrata* and *cordigera*; *saginoides* and *Hirculus*; *corymbosa*, *diversifolia*, and *latiflora*; *Jacquemontiana* and *Stella-aurea*; between some of which we find intermediate specimens do occur, and between others such may be found in future.

On the other hand, it would probably meet the views of those who take the extreme opposite view, to extend the species founded on our materials to 47, by dividing *ligulata* and *Stracheyi* each into two; the same with *ramulosa*, *imbricata*, *flagellaris*, *corymbosa*, *Hirculus*, and *diversifolia*. Of all these, we think the varieties of *Stracheyi* and *corymbosa* best entitled to reconsideration.

From this it appears that nearly half the forms we have examined are extremely variable; but the difficulty does not end here, for of the 26 most distinct forms, upwards of half have been gathered in one province alone, most of them by one individual, and in one or a few spots only; and no one can predicate the direction or limits within which they will prove variable when all their forms shall have been studied.

We have not attempted to give detailed descriptions of the species, and our diagnoses are little better than indications of the most prominent differential and other characters which the forms present. Whatever views may be taken of the limits between the species, as here proposed, there can be none about the certainty, that other specimens of them from different quarters of the Himalaya will greatly influence their diagnoses and render detailed descriptions of them worthless. What we have endeavoured to do, is to give a correct systematized review of the genus as it is developed in India, in every case indicating the forms which those who attach a different value from ourselves to the word 'species,' may combine or keep separate.

Gen. I. SAXIFRAGA, *L.*

§ I. BERGENIA. *Rhizoma* crassum. *Folia* ampla; petiolo basi dilatato. *Calyx* 5-lobus, lobis obtusis erectis. *Petala* alba v. rosea v. purpurea.

1. SAXIFRAGA LIGULATA, *Wall.* (*in As. Trans.* xiii. 398). Foliis orbiculatis obovatisve basi cordatis integerrimis ciliatis, panicula glaberrima.

a. Foliis amplis utrinque glabratis, petiolis late orbiculatis. *S. ligulata*, Hook. Bot. Mag. 3406; Exot. Flora, i. t. 49.

β. ciliata, foliis amplis utrinque hirsutis, petalis ovatis. *S. ciliata,* Royle, Ill. 226. t. 49. f. 2; Hook. Bot. Mag. 4915.

γ. Foliis minoribus utrinque glabratis obovatis basi cordatis, petiolis brevibus, petalis obovato-cuneatis. *S. ciliata,* Lindl. Bot. Reg. 1843, t. 65?

Hab. Rupibus Himalayæ totæ temperatæ et subtropicæ, alt. 4000–10,000 ped. a Bhotan! *Griffith*; ad Marri! *Fleming.* Montibus Khasia, alt. 4000–5000 ped.! *De Silva,* &c. (fl. vere.) (v. v.)

Variat *foliis* 2 unc. ad pedalem diametro, margine integerrimo v. denticulato, paginis utrisque hirsutis glaberrimisve lævissimis v. punctatis; petiolis brevibus elongatisve robustis gracilibusve, basi longe v. breve vaginantibus, hirsutis glaberrimisve; *panicula* parce v. copiose dichotome ramosa, pedicellis brevibus v. elongatis; *floribus* paucis v. numerosis, $\frac{1}{3}$ ad 1 unc. latis; *calycis* lobis glaberrimis ciliatisve; *petalis* late obovato-orbiculatis cuneatisve, brevibus elongatisve, albis roseis v. subpurpurascentibus; *carpellis* 2–3; *stylis* erectis v. divaricatis.

2. SAXIFRAGA STRACHEYI (*Hf. & T.*). Foliis obovatis obovato-cuneatisve grosse crenatis basi angustatis non aut vix cordatis, panicula glanduloso-pubescente. (Potius forma alpina *S. ligulatæ.*)

a. Foliis obovatis ciliatis subtus punctatis. *S. ciliata,* Lindl. in Bot. Reg. 1843, t. 65? (Cf. *S. ligulata γ.*)

β. Foliis cuneato-oblongis supra medium profunde crenatis non ciliatis subtus epunctatis (forma valde distincta).

Hab. Regione temperata et alpina Himalayæ occidentalis, alt. 8000–14,000 ped. Kumaon! *Strachey & Winterbottom.* Simla! Kunawur! Kishtwar! et Kashmir! *Thomson* (fl. Jun.) (v. v.)

Var. *β.* in Tibetia occidentali temperata et alpina, alt. 10,000–15,000 ped. Zanskar! *Thomson.* (v. v.)

Habitus et characteres pleræque *S. ligulatæ,* sed minor, foliis angustioribus basi angustatis vix cordatis paniculaque glanduloso-pubescente. In var. *β.* flores fid. *T. MSS.* luteoli, in *a.* albi v. pallide rosei, iis *S. ligulatæ* omnino similes.

3. SAXIFRAGA PURPURASCENS (*Hf. & T.*). Foliis obovato-rotundatis integerrimis glaberrimis, panicula pauciflora corymbosa glanduloso-pubescente, calyce profunde 5-lobo, petalis obovato-oblongis purpureis, floribus nutantibus.

Hab. In Himalaya orientali temperata et alpina Sikkim! alt. 10,000–14,000 ped., *J. D. H.* (fl. Maio.) (v. v.)

Verosimiliter species distincta ob calycem profundius 5-lobum, sed habitu characteribusque pluribus cum *S. Stracheyi* convenit, differt foliis latioribus glaberrimis eciliatis integerrimisque, panicula pauciflora, floribus omnibus nutantibus, petalisque purpureis.—*Folia* 2–3 unc. longa, interdum obscure sinuata, sæpius impresso-punctata. *Scapus* 3–6-pollicaris. *Flores* $\frac{3}{4}$–1 unc. lati. *Calyx* glandulosus. *Petala* interdum longe unguiculata.

§ II. PORPHYRION. Cæspitosi. *Folia* subopposita, parva, crasse coriacea. *Calyx* 5-lobus, lobis obtusis erectis. *Petala* purpurea v. rosea.

4. SAXIFRAGA OPPOSITIFOLIA (*Linn. Sp. Pl.* 575). Dense cæspitosa, foliis imbricatis suboppositis oblongis obtusis ciliolatis, floribus sessilibus terminalibus erectis, petalis purpureis lineari-obovatis.—*D.C. Prodr.* iv. 17; *Smith, Engl. Bot.* t. 9.

Hab. Tibetia boreali-occidentali alpina. Nubra, alt. 15,000–17,000 ped.! *Thomson* (fl. Aug.) (v. v.)

Distr. Alpibus Europæ et Asiæ borealis, terrisque arcticis hemisphæriæ borealis.

Exemplaribus Europæis omnino congruit. *Carpella* 2–3.

§ III. AIZOONIA. Cæspitosi. *Folia* alterna, imbricata, subsessilia, crasse coriacea, cartilagineo-marginata, sæpe porosa. *Flores* flavi v. albi. *Calyx* 5-lobus, lobis erectis.

5. SAXIFRAGA RAMULOSA (*Wall. Cat.* 446). Foliis imbricatis rosulatis lineari-oblongis acutis v. mucronatis glaberrimis interdum foveolatis, pedunculis brevibus 1-floris calycibusque glanduloso-hirsutis.

α. Major, foliis $\frac{1}{3}$ unc. longis, interdum basi ciliatis, floribus $\frac{1}{2}$ unc. diam.

β. Minor, densius cæspitosa, foliis brevibus superne oblique truncatis apice foveolato, floribus parvis.

Hab. Himalaya occidentali temperata et subalpina; Kumaon et Garwhal, alt. 8000–12,000 ped.! *Blinkworth*, &c. Var. *β.* alt. 10,000–13,000 ped.! *Edgeworth*, &c. (fl. æstate.)

Saxifragæ cæsiæ et *aretioidi* affinis.

6. SAXIFRAGA IMBRICATA (*Royle, Ill.* 226. t. 49). Densissime cæspitosa, foliis brevibus arcte imbricatis breviter ovatis obtusis supremis apice truncato perforatis, floribus sessilibus, calyce glanduloso-pubescente.

α. Foliis ciliatis supremis v. omnibus apice perforatis et sæpius marcescentibus. *S. ciliata*, Walp. non Royle.

β. Foliis glabris supremis v. omnibus apice perforatis et sæpius marcescentibus.

γ. Foliis omnibus glaberrimis ovato-oblongis non perforatis.

δ. Foliis ciliatis non perforatis.

Hab. Regionibus alpinis Himalayæ totius et Tibetiæ, alt. 12,000–18,000 ped. a Sikkim! *J. D. H.*; ad Kashmir! *Jacquemont.* (fl. Jun., Jul.) (v. v.)

Species protea et verosimiliter forma alpina *S. ramulosæ*. Var. *δ.* ad *S. Jacquemontianam* tendet.

7. SAXIFRAGA HEMISPHÆRICA (*Hf. & T.*). Densissime cæspitosa, foliis arctissime imbricatis ovato-oblongis obtusis margine scariosis longe ciliatis, floribus minimis sessilibus, sepalis distinctis lineari-oblongis obtusis late scarioso-ciliatis, carpellis brevibus.

Hab. Himalaya orientali alpina; Sikkim locis aridis, alt. 16,000–18,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Species singularis hemisphæras parvas efficiens, ob foliorum margines scariosas argenteas crebre ciliatas facile distinguenda. *Petala* non visa, an ulla?—Habitus et folia *S. perpusillæ* subsimilia. *Filamenta* lineari-elongata plana.

§ IV. NEPHROPHYLLUM. In speciebus Himalaicis *caules* foliosi. *Folia* rotundato-cordata, sparsa, dentata v. lobata. *Flores* inter majores, paniculati. *Calyx* parvus, profunde 5-fidus, lobis erectis, basi ovario adhærens. *Petala* alba.

8. SAXIFRAGA GRANULATA (*Linn. Sp. Pl.* 577). Perennis, rhizomate bulbifero, caule simplici glanduloso-pubescente, foliis reniformi-rotundatis 5–9-lobatis crenatisve supremis 3–5-fidis, floribus paniculatis, calycis lobis oblongis obtusiusculis, petalis albis spathulato-obovatis ter brevioribus.—*D.C. Prodr.* iv. 35 (descript. styli except.); *Engl. Bot.* t. 500.

Hab. Himalaya occidentali subalpina et alpina, alt. 10,000–15,000 ped. Kumaon! et Garwhal! *Edgeworth, Strachey* et *Winterbottom.* Kunawur! *Royle.* Zanskar! Kishtwar! et Kashmir! *Thomson.* (fl. Jun., Jul.) (v. v.)

Distr. Europa tota temperata et Africa boreali.

Cum exemplaribus Anglicis omnino congruit.

9. SAXIFRAGA CERNUA (*Linn. Sp. Pl.* 577). Perennis, rhizomate bulbifero, caule simplici glabriusculo, foliis reniformi-rotundatis 5–7-lobis supremis oblongis bulbiferis (*i. e.* flores abortivos gerentibus), floribus solitariis paucisve, sepalis liberis oblongis obtusis, petalis albis obovato-spathulatis. (Certe forma alpina *S. granulatæ.*)—*D.C. Prodr.* iv. 37; *Engl. Bot.* t. 664.

Hab. Tibetia occidentali alpina, alt. 15,000–17,000 ped.! Ladak! Nubra! &c. *T. Thomson* et *H. Strachey.* (fl. Aug.) (v. v.)

Distr. Alpibus Europæ, Americæ borealis temperatæ, Asiæ borealis, terrisque Arcticis.

Exacte cum exemplaribus Scoticis quadrat.

10. SAXIFRAGA ORIENTALIS? (*Jacquin, Obs.* ix. t. 34). Annua, caule gracili ramoso puberulo, foliis reniformi-rotundatis acute et grosse 7–9-dentatis lobulatisve superioribus cuneatis acute 5-lobis, floribus terminalibus solitariis parvis, sepalis ovato-oblongis acutis, petalis spathulatis, stylis gracilibus, stigmatibus capitatis.—*Don in Linn. Trans.* xiii. 369.

Hab. Himalaya occidentali alpina. Kumaon, alt. 14,000–15,000 ped.! *Strachey* et *Winterbottom.*

Distr. Asia Minor, Syria, Caucaso.

Exemplaria pauca plantæ Asiæ orientalis simillima.

11. SAXIFRAGA ODONTOPHYLLA (*Wall. Cat.* 454). Perennis, glanduloso-pubescens, rhizomate bulbifero, caule simplici v. superne ramoso, foliis late reniformibus 7–12-lobulatis, lobulis latis rotundatis obtusis apiculatisve, floribus paniculatis racemosisve, sepalis lineari-oblongis.

Hab. Himalaya occidentali subalpina. Kumaon! *Blinkworth.* Kulu ad Rotang Pass, alt. 12,000 ped., *Edgeworth.* (fl. Aug.)

S. granulatæ similis, sed caule robustiore, foliis plerisque radicalibus latioribus reniformibus, lobulis pluribus et obtusis; foliis caulinis nullis v. paucis et majoribus; floribusque majoribus.

12. SAXIFRAGA SIBIRICA (*Linn. Sp. Pl.* 577). Perennis, rhizomate squamato, caule debili basi petiolisque pubescente superne ramoso, foliis radicalibus reniformi-rotundatis 3–7-lobulatis lobulis subacutis superioribus simplicibus lanceolatis v. 3-lobis, floribus paniculatis pedicellis remotis gracilibus elongatis calycibusque puberulis glabrisve, sepalis ovatis, petalis albis obovato-spathulatis.—*Don in Linn. Trans.* xiii. 365; *Sternberg, Saxif.* 23. t. 25.

Hab. Himalaya occidentali temperata. Kishtwar, alt. 8000–9000 ped.! *Thomson.* (fl. Jun.) (v. v.)

Distr. Omni Siberia, Caucaso, et America occidentali arctica.

§ V. ARABIDEA. *Caulis* v. *scapus* erectus, foliosus. *Folia* alterna, subcuneata, plana, dentata. *Flores* albi. *Calyx* liber, patens.

13. SAXIFRAGA STRIGOSA (*Wall. Cat.* 448). Hispido-pilosa, caule rigido glanduloso basi folioso superne foliato ramoso, foliis radicalibus rosulatis lanceolatis acutis grosse inæqualiter paucidentatis caulinis sessilibus oblongis, axillis supremis bulbiferis, flore subsolitario pedicello gracili, sepalis ovato-lanceolatis glanduloso-pilosis, petalis albis, ovario oblongo, stylis brevibus.—*D.C. Prodr.* iv. 41.

Hab. Himalaya centrali et orientali subalpina, alt. 9000–14,000 ped. Bhotan! *Griffith.* Nepal! *Wallich.* Sikkim! *J. D. H.* (fl. Jul.) (v. v.)

Herba spithamæa, rigida. *Folia radicalia* petiolata, 1–1½-pollicaria, *caulina* sæpe reflexa. *Rami supremi* ob bracteas bulbiferas patulas v. reflexas subsquarrosi. *Flos* sub ⅓ unc. diametr.; *sepala* et *petala* patentia.

§ VI. MICRANTHES. *Caulis* subnullus. *Folia* radicalia petiolata. *Scapus* paniculatus. *Calyx* basi ovario adhærens, conicus. *Petala* alba.

14. SAXIFRAGA MICRANTHA (*Edgew. in Linn. Trans.* xx. 50). Glabrata v. basi parce pilosa, foliis radicalibus longe petiolatis ovato-cordatis obtusis profunde crenatis, scapo nudo superne ramoso ad axillas foliato, pedicellis pubescentibus, floribus paniculatis minimis, capsulis majusculis oblongis stylis brevibus.

Hab. Himalaya temperata et subalpina. Kumaon, alt. 9000–10,000 ped.! *Edgeworth*. Sikkim, alt. 10,000–14,000 ped., *J. D. H.* (fl. Jul.) (v. v.)

Folia 1–1½ unc. longa. *Scapi* spithamæi et ultra. *Pedicelli* fructiferi elongati. *Calyx* basi conicus. *Petala* post anthesin crescentia, late obovata, interdum inæqualia. *Filamenta* plana, supra medium dilatata; antheris rotundatis. *Carpella* 2–3, punctata.

15. SAXIFRAGA PALLIDA (*Wall. Cat.* 450). Foliis radicalibus ovatis crenato-serratis dentatisve, scapo simplici v. ramoso glabro v. pubescenti-piloso, bracteis lanceolatis inferioribus interdum bulbiferis, floribus majusculis solitariis paniculatisve, calyce basi conico ovario adnato lobis demum reflexis, petalis albis ellipticis, filamentis linearibus, capsulis late oblongis, stylis brevibus.—*D.C. Prodr.* iv. 38.

Hab. Himalaya alpina. Kumaon! *Blinkworth*; alt. 14,500 ped.! *Strachey* & *Winterbottom*. Nepal! *Wallich*. Sikkim! alt. 13,000–17,000 ped., *J. D. H.* (fl. Jun.–August.) (v. v.)

Minor et robustior quam *S. micrantha*. *Petioli* lati, in laminam sensim dilatati. *Scapus* 1–10-florus, robustus v. gracilis. *Calycis* tubus interdum elongatus capsulam semivestiens, lobi forma varii. *Flores* ⅓–¾ poll. lati, albi. *Capsula* nunc ½ poll. longa, crassa, castanea; stylis 2 crassis recurvis.

§ VII. HIRCULUS. *Caules* foliosi. *Folia* varia. *Flores* lutei. *Sepala* libera, erecta v. demum patula v. reflexa.

a. Flagelliferæ. Stolones *filiformes*. Calyces *erecti*, *v. in* S. Brunoniana *patentes*.

16. SAXIFRAGA FLAGELLARIS (*Willd.* & *Sternb. Rev. Sax.* 25. t. 6). Glanduloso-pubescens, stolonibus filiformibus apice proliferis, foliis lineari- v. ovato-lanceolatis glanduloso-ciliatis radicalibus rosulatis, caulinis numerosis, floribus corymbosis, sepalis lineari-oblongis erectis.

α. Foliis ciliatis serratisve mucronatis. *S. mucronulata*, Royle, Ill. p. 227.

β. Foliis spinuloso-ciliatis aristatis. *S. spinulosa*, Royle, Ill. p. 227. t. 50. f. 2.

Hab. Himalaya et Tibetia alpina, alt. 10,000–17,000 ped. a Sikkim! *J. D. H.* ad Kunawur! *Royle*, &c. Ladak! *Thomson*. (fl. Jul.) (v. v.)

Distr. Terra arctica hemisphæræ totæ borealis.

Caulis 1–6-uncialis. *Folia* ½–1½ unc. longa, glabra v. utrinque glandulosa, obtusa v. acuta. *Flores* erecti, flavi, subsolitarii v. corymbosi, interdum congesti. *Calyx* dense glandulosus. *Petala* magnitudine varia, 5–9-nervia.

17. SAXIFRAGA STENOPHYLLA (*Royle, Ill.* p. 227. t. 50. f. 1). Glabrata, stolonibus filiformibus proliferis, foliis lineari-oblongis obtusis glabris v. obscure glanduloso-ciliatis inferioribus rosulatis, caulinis numerosis consimilibus, floribus solitariis corymbosisve, pedicellis calycibusque erectis glanduloso-pubescentibus.—Verosimiliter varietas *S. flagellaris*.

Hab. Himalaya occidentali alpina. Kumaon! 11,000–15,000 ped.! *Edgeworth, Strachey* & *Winterbottom*. Kashmir, *Royle*.

A *S. flagellari* differt, glabritie, et foliis obtusis v. vix mucronulatis, non aut vix ciliatis.

18. **Saxifraga pilifera** (*Hf. & T.*). Glanduloso-puberula, stolonibus filiformibus proliferis, foliis brevibus lineari-oblongis obtusis radicalibus rosulatis, floribus parvis corymbosis, calyce basi hemisphærico lobis brevibus obtusis erectis, petalis calycem vix superantibus.

Hab. Himalaya orientali alpina. Sikkim, alt. 14,000-15,000 ped.! *J. D. H.* (v. v.)

Species parvula 2-4-uncialis. *Folia* $\frac{1}{4}$-$\frac{1}{2}$ unc. longa, crassiuscula. *Flores* iis *S. flagellaris* multoties minoribus, sub $\frac{1}{4}$ unc. latis, breve pedicellatis. *Calyx* brevis semisuperus. *Capsula* brevis, stylis crassis.

19. **Saxifraga Brunonis** (*Wall. Cat.* 444). Glaberrima, stolonibus capillaribus non proliferis, caulibus subcæspitosis, foliis linearibus patentibus ciliatis aristatis nitidis, caulinis sparsis supremis interdum bulbiferis, caulibus gracilibus nitidis glaberrimis v. sparse glandulosis, floribus subsolitariis, calycibus glabris ovato-oblongis obtusis patulis petalis lineari-obovatis flavis multo brevioribus, capsula turgida stylis brevissimis.—*D.C. Prodr.* iv. 45.

Hab. Sylvis Himalayæ temperatæ et subalpinæ, alt. 7000-12,000 ped. Simla! *Madden*, &c.; Kumaon! *Blinkworth*, &c.; Sikkim, *J. D. H.* (fl. Jul., August.) (v. v.)

Indole florum ab aliis hujus subsectionis longe recedens, et *S. filicauli* proxime affinis.

b. **Trachyphyllum.** Estoloniferæ. Caules *subsimplices, foliosi.* Folia *parva, sessilia, radicalia vix ulla.* Flores *subsolitarii, terminales, pedicellati, flavi.* Calyx *patens v. reflexus.*

20. **Saxifraga filicaulis** (*Wall. Cat.* 445). Hispido-glandulosa, caulibus subcæspitosis rarius simplicibus rigidis flexuosis, foliis omnibus sparsis alternis lineari-lanceolatis acuminatis scaberulis marginibus recurvis axillis supremis sæpe bulbiferis, floribus terminalibus solitariis pedicellatis sepalisque lineari-oblongis glandulosis, petalis obovato-spathulatis 3-nerviis, stylis gracilibus.—*D.C. Prodr.* iv. 46.

Hab. Himalaya occidentali temperata, alt. 7000-10,000 ped. Kumaon! *Blinkworth*, &c.; Simla! *Madden*, &c.; Kulu! *Edgeworth*. (fl. Aug., Sept.) (v. v.)

Caules spithamæi, basi bulbiferi. *Folia* $\frac{1}{3}$ unc. longa, subsquarrosa. *Flores* $\frac{1}{3}$-$\frac{1}{2}$ unc. lati.

21. **Saxifraga brachypoda** (*Don, Linn. Trans.* xiii. 378). Glaberrima, caulibus simplicibus foliosis, foliis nitidis erecto-patentibus reflexisve subulato-lanceolatis acuminatis basi cordato-semiamplexicaulibus integerrimis ciliatisve, axillis interdum bulbiferis, pedicello gracili terminali 1-floro glaberrimo v. glanduloso, sepalis ovatis acuminatis, petalis late obovatis flavis, stylis graciliusculis strictis.—*Don,*

Prodr. 209; *D.C. Prodr.* iv. 46. S. glandulosa, *Wall. Cat.* 442; *D.C. Prodr.* iv. 45.

Hab. Sylvis Himalayæ temperatæ et subalpinæ, alt. 9000–13,000 ped. Kumaon! *Blinkworth*; Nepal! *Wallich*; Sikkim! *J. D. H.*; Bhotan! *Griffith.* (fl. August.) (v. v.)

Habitus fere *Lycopodii* ob folia subimbricata interdum reflexa et deorsum imbricata. *Folia* ⅓ unc. longa; bulbillis interdum squarrosis. *Flores* ½ unc. diametr.

22. SAXIFRAGA FIMBRIATA (*Wall. Cat.* 443). Caule superne glanduloso hispidulo rigido simplici, foliis patentibus rigidis nitidis sessilibus subdensis subulato-lanceolatis aristato-acuminatis basi cordatis spinuloso-ciliatis axillis prolifero-bulbiferis, pedicellis rigidis terminalibus solitariis binisve sepalisque oblongis setoso-glandulosis, petalis late obovatis, stylis strictis graciliusculis.—*D.C. Prodr.* iv. 45.

Hab. Himalaya alpina et temperata, alt. 11,000–14,000 ped., Kumaon! *Blinkworth*, &c.; Nepal! *Wallich*; Sikkim, *J. D. H.* (fl. Jul.) (v. v.)

S. *brachypodæ* valde affinis sed major, foliis majoribus latioribus basi non semi-amplexicaulibus, cartilagineo-marginatis et longe spinuloso-ciliatis. *Flores* majores.

23. SAXIFRAGA HISPIDULA (*Don in Linn. Trans.* xiii. 380). Pubescenti-pilosa v. hispidula, caule gracili flexuoso laxe foliato, foliis sessilibus oblongo-lanceolatis acutis integerrimis v. grosse 1–2-dentatis utrinque pubescentibus axillis interdum bulbiferis, pedicellis solitariis terminalibus 1-floris sepalisque ovatis acutis hispido-glandulosis, petalis late obovatis calyce duplo longioribus.—*S. Evolvuloides,* Wall. Cat. 447; D.C. Prodr. iv. 46.

Hab. Himalaya centrali et orientali alpina. Nepal! *Wallich*; Sikkim, alt. 13,000–15,000 ped., *J. D. H.* (fl. August.) (v. v.)

Species distinctissima. *Caules* 4–6 unc. longi. *Folia* ½–⅔ unc. longa, 2 ad 2½plo longiora quam lata, opaca, sessilia, basi angustata. *Flores* ⅓ unc. lati, crocei.

c. Cæspitosi. Caules scapi*ve erecti, laxe foliati,* 1-*flori.* Folia, *non secus ramos omnes imbricata, radicalia petiolata, caulina sessilia.* Sepala *patula v. erecta.* Petala *flava* (*vide* S. Hirculus *in subsectione sequenti*).

24. SAXIFRAGA PALPEBRATA (*Hf. & T.*). Dense cæspitosa, glanduloso-pubescens, caulibus scapisve erectis 1-floris, foliis longe ciliatis radicalibus petiolatis spathulatis obtusis, caulinis sessilibus lineari-oblongis obtusis, flore subsessili majusculo, sepalis late oblongis obtusis ciliatis petalis obovatis aureis ½ brevioribus, ovario oblongo-conico, stylis brevissimis.—Ad *S. Hirculus* tendit.

Hab. Himalaya alpina. Kumaon, 13,000 ped., *Strachey & Winterbottom*; Sikkim, alt. 13,000–15,000 ped.! *J. D. H.* (fl. August.) (v. v.)

Species pulchella 2–3-uncialis, cæspites latos amplos floribus amplis opertos efficiens. *Folia* radicalia $\frac{1}{3}$ unc. longa, caulina breviora longius ciliata. *Flores* lati, $\frac{1}{3}$ unc. diametr.

25. SAXIFRAGA CORDIGERA (*Hf. & T.*). Dense cæspitosa, glanduloso-pilosa, caulibus scapisve erectis 1-floris, foliis longe ciliatis radicalibus petiolatis spathulatis obtusis caulinis ovato-cordatis, flore subsessili majusculo, sepalis late oblongis obtusis ciliatis petalis obovatis aureis $\frac{1}{2}$ brevioribus, ovario late conico, stylis brevissimis.

Hab. Himalaya orientali alpina, Nepal et Sikkim, alt. 12,000–14,000 ped.! *J. D. H.* (fl. Aug.) (v. v.)

S. palpebratæ simillima, et vix differt, nisi foliis radicalibus longius petiolatis, caulinisque cordatis.

26. SAXIFRAGA SAGINOIDES (*Hf. & T.*). Densissime cæspitosa, caulibus inter folia scapisque laxe pilosis, foliis densissime imbricatis anguste linearibus longe membranaceo-vaginantibus obtusiusculis recurvo-patentibus vaginis ciliatis, scapis brevibus 1-floris, foliis parvis linearibus sepalisque lineari-oblongis obtusis eglandulosis, petalis linearibus lineari-oblongisve sepalis paulo longioribus.

Hab. Himalaya alpina, Kumaon, alt. 13,000 ped.! *Strachey & Winterbottom*; Sikkim, alt. 14,000–18,000 ped.! *J. D. H.* (fl. August.) (v. v.)

Species submuscoidea, cæspites latos 1 ped. et ultra læte virides efficiens, floribus parvis aureis stellata. *Folia* glaberrima, coriacea sed non rigida, $\frac{1}{4}$–$\frac{1}{3}$ unc. longa, petiolo vaginante scarioso brunneo æquilongo, marginibus recurvis planisve. *Scapi* $\frac{1}{4}$ unc. longi, pilis brunneis laxe vestiti. *Flores* $\frac{1}{6}$ unc. lati. *Ovarium* conico-oblongum, sæpe abortivum; stylis subulatis recurvis.—Inter formas minimas alpinas *S. Hirculi* perplurimas vidimus ab *S. saginoides* ægre distinguendas.

27. SAXIFRAGA ARISTULATA (*Hf. & T.*). Dense cæspitosa, caulibus scapisque laxe pilosiusculis, foliis radicalibus anguste linearibus rigidis nitidis integerrimis glaberrimis marginibus recurvis apice arista decidua terminatis, scapis unifloris superne glanduloso-pilosis, sepalis lineari-oblongis glaberrimis, petalis obovatis orbiculatisve.

Hab. Himalaya orientali alpina, Sikkim, alt. 16,000 ped.! *J. D. H.* (fl. Aug., Sept.) (v. v.)

Inter *S. saginoidem* et *S. Brunonis* et *S. filicaulem* oscillat. Habitus *S. saginoidis* et *S. Brunonis*, textura et flores *S. filicaulis* et *S. Brunonis*, sed capsula non inflata et folia non ciliata. A *S. saginoide* conspicue differt foliis rigidis, arista decidua terminatis, marginibus recurvis, scapis glandulosis petalisque latioribus.

28. SAXIFRAGA LYCHNITIS (*Hf. & T.*). Cæspitosa, tota glanduloso-pilosa v. pubescens, foliis radicalibus ovatis breve petiolatis obtusis integerrimis caulinis sessilibus lineari-oblongis, flore magno nutante demum erecto, calyce oblongo atro-tomentoso segmentis erectis lineari-oblongis obtusis, petalis anguste lineari-elongatis.

Hab. Himalaya alpina, Kumaon, alt. 14,700 ped.! *Strachey & Winterbottom*; Sikkim, alt. 14,000–16,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Species distinctissima habitu fere *Lychnidis apetalæ*. *Color* luridus. *Scapi* exemplaribus e Kumaon pollicares, e Sikkim 4-pollicares. *Folia* radicalia conferta, ½ unc. longa, opaca, enervia; petiolo breviusculo membranaceo-marginato ciliato. *Scapus* firmus. *Flos* pro planta majusculus. *Calyx* ⅓ unc. longus, lobis tubo triplo longioribus. *Petala* marcescentia ½–⅓ unc. longa, interdum pollicaria et ligulata. *Stamina* filamentis filiformibus, antheris parvis. *Capsula* conico-oblonga, calyce inclusa, truncata, stylis 2 brevibus divaricatis terminata.

d. Cæspitosi. Caules scapive *erecti, laxe foliati, multiflori* (*in* S. Hirculus 1–3 *flori*). Folia *non imbricata, radicalia petiolata.* Sepala *in omnibus patula.* Petala *flava.*

29. SAXIFRAGA HIRCULUS (*Linn. Sp. Pl.* 575). Caule scapove superne laxe villoso, foliis radicalibus petiolatis lanceolato-spathulatis glaberrimis petiolis interdum ciliatis, caulinis sessilibus petiolatisve, floribus 1–3, sepalis late oblongis obtusis, petalis obovatis orbiculatisve, capsula conico-oblonga, stylis brevissimis divaricatis.—*D.C. Prodr.* iv. 45; *Engl. Bot.* t. 1009.

β. Petalis 5-nerviis basi nudis. *S. Hirculoides*, Dne. Plant. Jacq. 67. t. 78. fig. 1.

γ. Floribus dense corymbosis parvis, omnibus masculis ovariis imperfectis.

Hab. Himalaya orientali et Tibetia occidentali alpina. Kunawur, 15,000–16,000 ped.! *T. Thomson*; Sikkim, alt. 14,000 ped.! *J. D. H.*; Gugi, 17,000 ped.! *Strachey & Winterbottom*; Ladak! Nubra! &c., alt. 15,000–17,000 ped.! *Thomson*; Piti, *Jacquemont*. (fl. Jul.–Sept.) (v. v.)

Distr. Terris arcticis hemisphæræ totæ borealis, alpibus Europæ totius, Caucasi, Soongariæ.

30. SAXIFRAGA NUTANS (*Hf. & T.*). Caule erecto multifloro superne pedicellis calycibusque dense pubescenti-glandulosis, foliis radicalibus longe petiolatis elliptico-oblongis obtusis 3–5-nerviis ciliatis, caulinis sessilibus oblongis obtusis, floribus subracemosis confertis nutantibus, sepalis erectis lanceolato-oblongis glandulis atris, petalis spathulatis vel anguste lineari-oblongis obtusis pallide flavis.

Hab. Himalaya orientali subalpina. Sikkim, alt. 10,000–12,000 ped.! *J. D. H.* (fl. August.) (v. v.)

Species insignis, spithamæa, caule erecto foliato. *Folia* radicalia cum petiolo 2–3 unc. longa, laxe ciliata, interdum pilosula. *Racemi* terminales 7–12-flores. *Flores* fere ½ unc. longi. *Petala* calyce vix bis longiora. *Ovaria* exemplaribus nostris ut videtur imperfecta. *Stamina* inæqualia, filamentis filiformibus.

31. SAXIFRAGA VISCIDULA (*Hf. & T.*). Tota glanduloso-pubescens, caule inferne laxe piloso, foliis inferioribus petiolatis spathulato-lanceo-

latis subacutis, superioribus sessilibus oblongis, floribus solitariis corymbosisve, pedunculis calycibusque dense glandulosis, sepalis oblongis obtusis, petalis oblongo-spathulatis obtusis 5–7-nerviis marginibus eroso-ciliolatis glandulosis sepalis triplo longioribus.

Hab. Himalaya orientali alpina. Sikkim, alt. 13,000–15,000 ped.! *J.D.H.* (fl. August.) (v. v.)

Caulis 2–3-pollicaris, flexuosus, foliosus. *Folia* inferiora ½ unc. longa. *Flores* pro planta magni, ½ unc. longi. *Petala* erecto-patentia glandulis marginalibus interdum atris. *Ovarium* breviter oblongo-conicum, stylis parallelis rectis.

32. Saxifraga corymbosa (*Hf. & T.*). Caule gracili laxe foliato inferne glaberrimo superne pedunculis pedicellisque sparse glandulosis, foliis radicalibus longe petiolatis ovato-lanceolatis glaberrimis v. sparse pilosiusculis, caulinis sessilibus semiamplexicaulibusque, floribus erectis corymbosis, sepalis patulis v. reflexis oblongis glaberrimis glandulosisve, petalis patentibus glaberrimis.

a. Foliis radicalibus latioribus pilosiusculis opacis, caulinis basi attenuatis, sepalis glandulosis v. glaberrimis.

β. Foliis nitidis radicalibus minoribus angustioribus, caulinis basi cordato-semi-amplexicaulibus, calycibus glaberrimis. An species diversa?

Hab. Himalaya orientali temperata et subalpina, Sikkim, alt. 10,000–14,000 ped.! *J. D. H.* (fl. August.) (v. v.)

Inter *S. Hirculum* et *diversifoliam* media: a priore differt præcipue caule superne pedicellisque non villosis sed glandulosis, floribus corymbosis; —a posteriore caulibus gracilibus, foliis angustioribus, floribusque multo minoribus.

33. Saxifraga diversifolia (*Wall. Cat.* 452). Elata, caule robusto foliato superne glanduloso, inferne glaberrimo v. piloso, foliis longe petiolatis late ovatis lanceolatisve, caulinis late ovatis sessilibus, floribus corymbosis, bracteis calycibusque glandulosis, petalis obovatis ungue brevi basi interdum glanduloso-setosis.—*D.C. Prodr.* iv. p. 44; *Hook. Lond. Journ. Bot.* iv. p. 638. t. 21.

a. *lanceolata* (D.C. *l.c.*), foliis radicalibus elliptico- v. ovato-lanceolatis, caulinis ciliolato-glandulosis basi angustatis v. brevissime cordatis.

β. *parnassiæfolia* (D.C. *l. c.*), foliis radicalibus ovato-cordatis petiolis et pagina inferiore glabris v. hirsutis, caulinis late cordato-ovatis semiamplexicaulibus. *S. parnassiæfolia,* Don in Linn. Trans. xiii. 405 (male); D.C. Prodr. iv. 25.

γ. *Moorcroftiana* (D.C. *l. c.*), caule robustiore, foliis radicalibus ovatis cordatisve, caulinis late cordato-amplexicaulibus. *S. Moorcroftiana,* Wall. Cat. 453.

Hab. Himalaya tota subalpina et temperata copiosissime, a Sikkim! ad Kashmir! alt. 8000–15,000 ped. (fl. August., Sept.) (v. v.)

Planta variabilis, statura copiaque florum insignis.

34. **Saxifraga latiflora** (*Hf. & T.*). Caule erecto foliato sparse glanduloso-piloso, foliis radicalibus petiolatis ovato-ellipticis, caulinis majoribus amplis late ovatis basi angustatis sub-decurrentibus obtusiusculis, floribus solitariis paucisve maximis, calyce basi villoso, sepalis ovato-lanceolatis obtusis petalis ovato-oblongis paulo brevioribus.

Hab. Himalaya orientali alpina, Sikkim, alt. 12,000–14,000 ped.! *J. D.H.* (fl. August.) (v. v.)

S. diversifoliæ proxima et forma abnormis, sed foliis caulinis amplis et floribus fere pollicem latis diversissima.—*Caules* 4–5 unc. alti, robusti, glabriusculi. *Folia* radicalia pauca, parva; caulina 1½ unc. longa, ½–1 unc. lata. *Petala* glaberrima, basi non appendiculata. *Ovarium* et *stamina* ut in *S. diversifolia.*

35. **Saxifraga umbellulata** (*Hf. & T.*). Parvula, caulibus cæspitosis pedunculis pedicellis calycibusque dense glanduloso-pubescentibus, foliis carnosis densissime confertis rosulatis spathulatis glabriusculis, caulibus scapisve medio foliatis foliis glandulosis lineari-oblongis, superne corymboso-paniculatis, sepalis lineari-oblongis obtusis petalis obovatis dimidio brevioribus.

Hab. Himalaya orientali alpina, Sikkim, alt. 12,000–14,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Species singularis *Crassulam* parvam referens, congeneri nulli affinis. *Caules* brevissimi, scapis foliatis pollicaribus. *Folia* valde carnosa, recurva, densissime rosulata, ⅓–½ unc. longa, glabra v. sparse ciliata, petiolo crassiusculo, lamina parva obtusa. *Scapus* ascendens, subrigidus, basi nudus, supra medium foliatus, foliis linearibus obtusis patulis glandulosis, ibi subumbellatim ramosus, ramis pedicellisve ½-pollicaribus flexuosis 1–2-floris interdum bracteatis. *Flores* erecti, aurei, sub ¼ poll. lati; petala erecto-patentia. *Ovarium* breve, stylis brevibus.

e. Caules *dense cæspitosi ramosi, foliis imbricatis parvis crassiusculis densissime obtecti.* Flores *solitarii, flavi, terminales, sessiles, v. pedicello nudo.* Sepala *patula v. reflexa, rarius erecta.*

36. **Saxifraga Jacquemontiana** (*Dne. in Plant. Jacq.* 68. t. 78. f. 2). Densissime cæspitosa, glanduloso-puberula, foliis sessilibus dense imbricatis lineari-oblongis apice rotundatis glanduloso-ciliolatis pubescentibusque, floribus sessilibus pedicellatisve pedicello calyceque reflexo glanduloso, petalis lineari-oblongis, ovariis stylisque brevibus.

Hab. Himalaya alpina. Lahul! *Hay*; Kunawur, *Jacquemont*; Kumaon! 13,000 ped., *Strachey & Winterbottom*; Sikkim, alt. 15,000–18,000 ped.! *J. D. H.* (fl. August., Sept.) (v. v.)

Radix cæspitibus vetustioribus sublignosus, elongatus, divisus. *Rami* 1–2 poll. longi, cum foliis ¼ unc. diametr. *Flores* expansi ramis paulo latiores.

37. **Saxifraga Stella-aurea** (*Hf. & T.*). Cæspitosa, ramis interdum elongatis foliis dissitis, glabra v. parce glanduloso-puberula, foliis laxe imbricatis carnosulis oblongis apice rotundatis glaberrimis ciliolatisve, pedicellis terminalibus subelongatis glanduloso-pubescentibus 1-floris, calycibus glaberrimis, sepalis oblongis obtusis patentibus demum reflexis, capsula brevi late conica, stylis longiusculis subrecurvis.

Hab. Himalaya et Tibetia occidentali alpina. Kumaon, alt. 14,000 ped.! *Strachey & Winterbottom*; Tibetia occid. ad Pangong, alt. 17,000–18,000 ped.! *H. Strachey* (15); Sikkim, alt. 15,000–17,000 ped.! *J. D. H.* (fl. Aug., Sept.) (v. v.)

S. Jacquemontianæ valde affinis, sed minor, glabrior, laxius cæspitosa, pedicellis longioribus, sepalisque non aut vix ciliolatis.

38. **Saxifraga microphylla** (*Royle in Herb. Benth.*). Perpusilla, glaberrima, laxe cæspitosa, foliis laxe imbricatis lineari-oblongis obtusis carnosulis, pedicellis terminalibus gracilibus unifloris glanduloso-puberulis, calyce hemisphærico, sepalis erectis glaberrimis coriaceis, petalis oblongis coriaceis sepalis æquilongis, antheris subexsertis, stylis brevibus.

Hab. Himalaya occidentali alpina. Kumaon! (*Royle*) ad Barji-kang, alt. 14,500 ped.! *Strachey & Winterbottom.*

Species omnium minima, cæspites pollicem latos efficiens. *Caules* laxe ramosi, $\frac{1}{4}$ unc. longi. *Folia* subfasciculata, $\frac{1}{8}$ unc. longa. *Pedicellus* $\frac{1}{4}$ unc. longus. *Flores* iis *Saginæ* subsimiles, interdum apetali? *Petala* coriacea. *Filamenta* subfiliformia. *Capsula* nunc conica, stylo nullo, stigmate capitato; nunc bifida, stylis brevibus divaricatis, stigmatibus capitatis.

39. **Saxifraga perpusilla** (*Hf. & T.*). Dense cæspitosa muscoidea, ramis brevibus, foliis densissime imbricatis oblongis apice rotundatis basi lata sessilibus concavis marginibus fimbriato-ciliatis cæterum glaberrimis, pedicellis 1-floris glanduloso-pubescentibus, sepalis late oblongis obtusis ciliolatis petalis lineari-oblongis aureis $\frac{1}{3}$ brevioribus, stylis brevibus divaricatis.

Hab. Himalaya orientali alpina, Sikkim, alt. 16,000–17,000 ped.! *J. D. H.* (fl. Sept.) (v. v.)

Cæspites *S. hemisphæricæ* subsimiles, sed folia breviora margine et sepalorum margine non scariosa, floribus sublonge pedicellatis multoties majoribus, *S. Stella-aurea* referentibus. Apices ramulorum hemisphærici, $\frac{1}{8}$ unc. lati. *Pedicelli* $\frac{1}{5}$–$\frac{1}{3}$ unc. longi. *Flores* $\frac{1}{6}$ unc. lati. *Capsula* sepalis duplo longior.

Gen. II. CHRYSOSPLENIUM, *L.*

§ 1. Folia opposita.

1. **Chrysosplenium Nepalense** (*Don, Prodr. Flor. Nep.* 210). Glaberrimum, caule ascendente ramoso, foliis oppositis ovato- v. reniformi-cuneatis interdum subcordatis obtusis crenatis, floribus subses-

silibus, seminibus parvis glaberrimis.—D.C. Prodr. iv. 48. (An *C. oppositifolium*, var.?)

Hab. Himalaya centrali et orientali temperata. Nepal! *Wallich*; Sikkim, alt. 7000–10,000 ped., *J. D. H.* (fl. Mai., Jun.) (v. v.)

Distr. America boreali occidentali et Kamtchatka.

C. oppositifolio simillima, sed folia manifeste et regulariter crenata, lobulis latiusculis. *Semina* nitida (opaca fid. D.C.).

2. CHRYSOSPLENIUM TRICHOSPERMUM (*Edgeworth, MSS.*). Glaberrimum, caule ascendente ramoso, foliis oppositis ovato-oblongis obtusis basi cuneatis subserratis, floribus pedicellatis majusculis, seminibus magnis nitidis pilosis.

Hab. Himalaya occidentali temperata. Kumaon, alt. 7000–8000 ped.! *Edgeworth, Madden, Strachey & Winterbottom.*

C. Nepalensi major, robustior, foliis magis oblongis, floribus pedicellatis majoribus, seminibus magnis laxe patentim pilosis.

§ 2. Folia alterna.

3. CHRYSOSPLENIUM ALTERNIFOLIUM (*Linn. Sp. Pl.* 569). Suberectum, glaberrimum, caule longe nudo, foliis radicalibus longe petiolatis reniformi-rotundatis crenato-lobulatis lobulis latis retusis, superioribus breve petiolatis cordato-rotundatis, floribus sessilibus, seminibus nitidis glabris.—*Engl. Bot.* t. 54.

Hab. Himalaya orientali alpina, Sikkim, alt. 12,000–15,000 ped.! *J.D.H.* (fl. August.) (v. v.)

Distr. Cum planta Europæa omnino quadrat.

4. CHRYSOSPLENIUM TENELLUM (*Hf. & T.*). Glaberrimum, caulibus filiformibus procumbentibus intertextis, foliis alternis (parvis) late reniformi-rotundatis profunde cordatis late crenato-lobulatis, floribus sparsis breve pedicellatis, seminibus glaberrimis politis nitidissimis.

Hab. Himalaya occidentali temperata. Kumaon, *Royle*, alt. 10,000 ped.! *Strachey & Winterbottom.*

Species pusilla, *Hydrocotylem* referens. *Caules* sicco filiformes. *Folia* $\frac{1}{4}$–$\frac{1}{3}$ unc. diametr., longe petiolata.

5. CHRYSOSPLENIUM CARNOSUM (*Hf. & T.*). Glaberrimum, cæspitosum, radicibus crasse fibrosis, caulibus erectis crassis ramosis basi foliis squamæformibus laxe vaginatis, foliis alternis breve late petiolatis cuneato-ovatis obtusis crenato-dentatis, floribus sessilibus.

Hab. Himalaya orientali alpina, Sikkim, alt. 14,000–15,000 ped.! *J. D. H.* (v. v.) (fl. August.)

Luride virens, caulibus 2–3-pollicaribus, radicibus 3–5-pollicaribus descendentibus fibrosis. *Folia* radicalia 0, caulina carnosa, $\frac{1}{3}$–$\frac{1}{2}$ unc. longa, infra medium late cuneata integerrima. *Flores* luridi, calycis lobis purpureis. *Semina* immatura.

6. **Chrysosplenium lanuginosum** (*Hf. & T.*). Caulibus carnosis suberectis ramosis petiolisque laxe lanuginosis, foliis alternis inferioribus ovatis ovato-cordatisve obtusis obscure crenatis utrinque laxe pilosis superioribus longe petiolatis reniformibus supremis glabratis, floribus breve pedicellatis.

Hab. Himalaya orientali temperata. Bhotan! *Griffith* (No. 2049).

7. **Chrysosplenium Griffithii** (*Hf. & T.*). Glaberrimum, caulibus longe nudis simplicibus superne divisis, foliis alternis longe petiolatis late reniformi-cordatis profunde lobulatis, lobulis oblongis obtusis, floribus parvis breve pedicellatis.

Hab. Himalaya orientali temperata. Bhotan! *Griffith* (No. 2051).

Species elegans, 3–4-uncialis, caule gracili longe nudo, ima basi squamoso. *Folia* ⅓ unc. lata, margine in lobulos apiculatos 6–12 obtusos incisa, sinubus acutis. *Flores* parvi, virides.

Gen. III. Tiarella, *L.*

1. *Tiarella polyphylla* (Don, Prodr. 210), D.C. Prodr. iv. 51.

Hab. Himalaya centrali et orientali temperata. Nepal! *Wallich*; Sikkim, alt. 7000–10,000 ped.! *J. D. H.*; Bhotan! *Griffith.* (fl. Jun.) (v. v.)

Gen. IV. Vahlia, *Th.*

1. *Vahlia oldenlandioides,* Roxb. Hort. Bengal. 86; Flor. Ind. ii. 89; Wight & Arn. Prodr. 364; Wight, Ill. ii. t. 115. *V. silenoides,* A. DeCand. in D.C. Prodr. iv. 54. *V. Oldenlandiæ,* D.C. *l. c.*

Hab. In Peninsula Indiæ tropicæ; Carnatic! Orissa! *Roxburgh,* &c.

Distr. Africa tropica boreali; Senegalia! et Nubia!

2. *Vahlia viscosa,* Roxb. Hort. Beng. 86; Flor. Ind. ii. 89; Wight & Arn. Prodr. 364. *V. Weldenii,* Reichb. Hort. Bot. 91; D.C. Prodr. iv. 53. *V. sessiliflora,* D.C. Prodr. iv. 54.

Hab. In Peninsula Indiæ tropicæ; Maisor! et Carnatic! *Roxburgh,* &c.; Bundelkhund! *Edgeworth*; planitie Gangetica superiore et Punjab! *Thomson,* &c.; Scinde! *Vicary.*

Distr. Africa tropica boreali; Senegalia! Nubia! Ægypto!

Gen. V. Astilbe, *Ham.*

1. *Astilbe rivularis,* Hamilt. ex Don, Prodr. Fl. Nep. 210; D.C. Prodr. iv. 51. *Spiræa barbata,* Cambess. in Plant. Jacq. *S. triternata,* Wall. Cat. 706.

Hab. In Himalaya temperata, alt. 5000–9000 ped., frequens a Sikkim! ad Simla! *Hamilton,* &c. Montibus Khasia, alt. 5000–7000 ped.! *Griffith,* &c. (fl. Jun.) (v. v.)

Distr. Java!

2. *Astilbe rubra,* Hf. & T. Bot. Mag. 4959.

Hab. Montibus Khasiæ regione temperata, alt. 5000–6000 ped.! *Griffith,* &c. (fl. August.) (v. v.)

Gen. VI. NEILLIA, *Don* (cf. Adenilema, *Blume*).

1. *Neillia thyrsiflora*, Don, Prodr. 228; D.C. Prodr. ii. 547; Wall. Cat. 698. *N. virgata*, Wall. Cat. 7108.
Hab. In Himalaya centrali et orientali temperata. Nepal! *Wallich*; Sikkim, alt. 5000-8000 ped.! *J. D. H.*; Montibus Khasia, alt. 5000–7000 ped.! *Wallich*, &c. (fl. Jun.) (v. v.)

2. *Neillia rubiflora*, Don, *l. c.*; D.C. *l. c.*
Hab. Himalaya centrali et orientali temperata. Nepal! *Wallich*; Sikkim, alt. 8000–10,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Gen. VII. HYDRANGEA, *L.*

1. *Hydrangea altissima*, Wall. Tent. Flor. Nep. t. 50; D.C. Prodr. iv. 14.
Hab. In Himalaya temperata, alt. 6000–10,000 ped.; frequens a Bhotan! *Griffith*, ad Simla! *T. Thomson*. (fl. Mai.) (v. v.)

2. *Hydrangea vestita*, Wall. Tent. Flor. Nep. t. 49, excl. var. β; D.C. Prodr. iv. 14. *H. heteromalla*, Don, Prodr. Fl. Nep. 211.
Hab. In Himalaya temperata, alt. 6000–10,000 ped., frequens a Bhotan! *Griffith*, ad Kumaon! *Strachey & Winterbottom*, &c. (fl. Jul.) (v. v.)
Folia late v. anguste ovata v. ovato-lanceolata, subtus dense pubescenti-tomentosa, supra glabra v. puberula. *Rami* glabri v. tomentosi; ramulis tomentosis. *Sepala* in fl. imperfectis 4, rotundata v. ovata, integerrima. *Styli* in conum crassum ad medium coaliti, dein erecti, liberi, validi.

3. **HYDRANGEA KHASIANA** (*Hf. & T.*). Foliis late ovato-cordatis argute denticulatis subtus dense cano-tomentosis, ramulis robustis corymbisque amplis ramosis densifloris subscaberulo-tomentosis, sepalis fl. imperfect. 4 late elliptico-oblongis obtusis integerrimis, stylis in conum latum connatis supra medium liberis erectis robustis.—An forma *H. vestitæ*?
Hab. Montibus Khasia, regione temperata rara ad Surureem et Kala-Panee, alt. 5000–6000 ped.! (fl. Jun.) (v. v.)
Ab *H. vestita* differt habitu robustiore, foliis multo latioribus, basi cordatis.

4. *Hydrangea aspera*, Don, Prodr. 211. *H. vestita*, var. *fimbriata*, Wall.? Tent. Flor. Nep. t. 49.
Hab. In Himalaya temperata, alt. 6000–7000 ped. Nepal! *Wallich*; Kumaon! *Strachey & Winterbottom*; Sikkim! *J. D. H.* (fl. Jun.) (v. v.)
*Rami ramuli*que appresse puberuli v. tomentosi. *Folia* lanceolata, argute serrata, subtus cano-tomentosa. *Corymbi* laxiflori; floribus exterioribus longe pedicellatis. *Sepala* floribus imperfectis 4–5, obovato-oblonga, apiculata, integerrima v. serrata. *Capsulæ* globosæ, stylis liberis, recurvis.

5. **HYDRANGEA STYLOSA** (*Hf. & T.*). Ramis gracilibus glabratis, ramulis corymbisque puberulis, foliis ellipticis sinuato-dentatis utrinque

glabratis nervis subtus puberulis, corymbo paucifloro, fl. imperfectis sepalis 4–5 late cuneato-oblongis grosse sinuato-crenatis, stylis liberis capsulæ æquilongis rectis subulatis.

Hab. In Himalaya orientali temperata. Sikkim, alt. 8000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Exemplaria manca. *Folia* 2-pollicaria, petiolata, submembranacea.

6. **Hydrangea robusta** (*Hf. & T.*). Ramulis robustis corymbis petiolisque pubescentibus, foliis longe petiolatis (petiolo superioribus alato) late ovatis ovato-cordatisve margine fimbriato-dentatis, superne asperulis subtus pubescenti-tomentosis, corymbis laxis multifloris, sepalis fl. imperfectis 4–5 late ovatis grosse serrato-dentatis, stylis liberis recurvis.

Hab. In Himalaya orientali temperata. Sikkim, alt. 5000–7000 ped.! *J. D. H.* (fl. August.) (v. v.)

Arbor parva, ramis robustis. *Folia* 3–4 unc. longa, petiolo 2–3-unciali, basi interdum valde inæqualia, pagina superiore pilis rigidis asperula, costa venisque primariis pubescentibus, suprema sæpius petiolo breviore alato, ala fimbriato-dentata. *Sepala* fl. imperfect. alba, magna, $\frac{3}{4}$–1 unc. longa, interdum lobata, corymbis luxuriantibus minora, subserrata v. imo integerrima.

Gen. VIII. ADAMIA, *Wall.*

Cyanites, *Reinwardt.* Dichroa, *Lour.*?

1. *Adamia cyanea,* Wall. Tent. Flor. Nep. 46. t. 36; Plant. As. Rar. t. 213. *Hydrangea anomala,* Don, Prodr. 211.—Cf. *Cyanites sylvatica,* Reinwardt, in Blume, Bijd. 921, et cf. *C. chinensis,* Gardn. (*versicolor,* Fortune), quæ differt floribus majoribus.

Hab. In Himalaya centrali et orientali temperata. Nepal! *Wallich.* Sikkim, alt. 6000–8000 ped.! *J. D. H.* Bhotan! *Griffith.* Mont. Khasia, alt. 4000–5000 ped., *J. D. H. & T. T.* (fl. Jun.) (v. v.)

Distr. Java? China?

Gen. IX. PILEOSTEGIA, *Hf. & T.*

1. *Pileostegia viburnoides,* Hf. & T. (Tab. II.)

Hab. Montibus Khasia, regione subtropica, *Lobb.* Prope Nunklow, alt. 3000–5000 ped.! *J. D. H. & T. T.* (fl. Jul.) (v. v.)

Frutex glaberrimus. *Rami* teretes. *Folia* opposita, petiolata, ovato-lanceolata, glaberrima, obscure versus apices sinuato-serrata, coriacea, penninervia, supra nitida. *Panicula* terminalis, ramosa, ramis suboppositis subcorymbosis ramulisque puberulis. *Floribus* sub $\frac{1}{3}$ unc. diametr. *Stamina* elongata. *Stylus* brevis. (Tab. II.)

Fig. 1, Flos; 2, id. corolla delapsa; 3, corolla; 4, stamen; 5, ovarium, calyx et stylus; 6, ovarium verticaliter sectum; 7, id. transverse sectum; 8, semen immaturum—*omnes sub lente aucti.*

Gen. X. POLYOSMA, *Bl.*

1. POLYOSMA WALLICHII (*Bennett, Plant. Jav. Rar.* 196). Ramulis petiolis racemisque pubescentibus, foliis oblongo-lanceolatis integerrimis serratisve subtus pubescentibus, floribus pedicellatis.—*Wall. Cat.* 8471.

Glossoma acuminatum, Wall. Cat.—An var. *P. integrifoliæ* Blume?
Hab. In Montibus Khasia regione tropica, alt. 2000–4000 ped.! *De Silva, J. D. H. & T. T.* (fl. Jun.) (v. v.)
Distr. Java?

2. POLYOSMA FRAGRANS (*Bennett in Plant. Jav. Rar.* 196). Foliis obovato-lanceolatis acuminatis, floribus sessilibus.—*Itea fragrans*, Wall. Cat. 8472 in parte, et in Roxb. Flor. Ind. ii. 420.

Hab. Peninsula Malayana ad Singapore! *Wallich*; Malacca! *Griffith.*

3. POLYOSMA INTEGRIFOLIA (*Blume, Bijd.* p. 659). Foliis lanceolatis acuminatis integerrimis subtus glabris, floribus pedicellatis.—*Bennett, Plant. Jav. Rar.* 196. *P. fragrans,* Wall. Cat. 8472 in parte.

Hab. Peninsula Malayana; ad Malacca! *Griffith.* Singapore! *Wallich.*
Distr. Java.

NIMMOIA, Wight=*Ameletia floribunda.*

Gen. XI. ITEA.

1. ITEA NUTANS (*Royle, Ill.* p. 226). Foliis ovato- v. elliptico-oblongis acuminatis argute serratis, racemis terminalibus folio longioribus.

Hab. In Himalaya occidentali temperata. Kumaon, alt. 3000–6000 ped.! *Royle,* &c. (fl. Jul.) (v. v.)

2. ITEA MACROPHYLLA (*Wall. Cat.* 7200). Foliis (3–5-pollicaribus) ovato- v. obovato-lanceolatis acuminatis serratis, racemis folio brevioribus longioribusve.—*Kurrimia*? Wall. Cat. 7200.

Hab. In Montibus Khasia regione tropica, alt. 2000–4000 ped.! *Wallich,* &c., et in Himalaya orientali tropica. Bhotan! *Griffith.* (fl. Jun.) (v. v.)

3. ITEA CHINENSIS (*Hook. & Arn. Bot. Beech.* 189. t. 39). Foliis (2-pollicaribus) obovatis obovato-lanceolatisve acuminatis serratis, racemis lateralibus foliis subæquilongis.—An forma *I. macrophyllæ*?

Hab. In Montibus Khasia regione temperata, alt. 4000–6000 ped.! *J. D. H. & T. T.* (fl. Mai.) (v. v.)
Distr. China.

Nat. Ord. PARNASSIEÆ.

Gen. I. PARNASSIA, *L.*

This genus abounds in the temperate and alpine regions of the mountains of India, attaining 17,000 feet of elevation. We consider it to be undoubtedly more nearly allied to *Saxifrageæ*

than to any other Order except *Droseraceæ*. In one curious physiological point it agrees with *Saxifraga* itself, viz. the stamens approaching the stigma by pairs, shedding their pollen and retiring, an economy common to all the species we have examined in a living state; it also agrees so remarkably with that genus in habit, that it is difficult to distinguish some of the small alpine species in their native places of growth at first sight; the petals in both are persistent, of a singularly thick and coriaceous or fleshy texture with transparent veins. Another point of resemblance with *Saxifrageæ* is the variable amount of adhesion of the calyx-tube and ovary: in all the species the ovary is almost free in a very young state, and it is more during the after-development of the fruit than of the ovary that the former becomes imbedded in the tube of the calyx. The stigmas are always free, and the very short styles also in the species with dehiscent capsules: in the half-superior fruited species with dehiscent capsules, the dehiscence takes place only above the calyx-tube, and the fruit of *P. nubicola* strongly resembles that of a *Wahlenbergia* in general appearance, though not in internal structure.

There are three principal modifications of the fruit in *Parnassia*: a superior ovoid 3–4-valved capsule, which is the structure in *P. palustris*, *P. foliata*, and several American species;—a superior trigonous coriaceous indehiscent capsule, in which the placentæ are sometimes confined to the lower part of the cell, and which has a longer style than either of the other forms of capsule; this characterizes the 'Peninsular' Khasia, and a few of the Himalayan species;—and a semi-superior fruit, as in the *P. nubicola*, *P. affinis*, *P. pusilla*, and *P. ovata*; species that may possibly prove forms of one.

The structure of the seeds and ovules of all is very similar, and has been well described: in being exalbuminous they differ from those of any of the other groups of *Saxifrageæ*, as well as from *Droseraceæ*, amongst which they are most frequently placed in systematic works.

The placentation in all the species is decidedly parietal, as in *Droseraceæ*; nor have I, in the earliest-examined stages, detected any evidence of this being a deviation from the axile type: this has been held as an argument against allying *Parnassia* with *Hypericineæ*, but which the truly parietal placentation of *Elodea* invalidates; the loculicidal dehiscence of *Parnassia*, on the other hand, is against its Hypericineous alliance, as are its truly perigynous stamens and petals.

The remarkable staminodia of *Parnassia* demand some notice: these we regard as a whorl of stamina opposite the petals: in *P. tenella*, they appear under a very unusual form, much more nearly resembling stamina than those of the other species, being columnar, and terminated by a broad horizontal glandular disk; these, if not absolutely inserted in the same whorl with the stamens, are so nearly so, that in the fully-formed flower the bases of the filaments touch the bases of the staminodia on either side of them. The much-divided staminodia of *P. palustris*, and which have in part suggested the alliance of the genus with *Hypericineæ*, are much less usual than the simply lobed or trifid; and the staminodia are in some species almost entire, and so small as to escape notice; their nearest homologue in structure and position is perhaps to be found in the hypogynous scales of the allied Order *Crassulaceæ*.

The only other anomalies we have to indicate amongst the Indian kinds are, the foliaceous scape of *P. foliata*, a species otherwise nearly related to *P. palustris*, and which assumes a very different habit from any of its congeners, resembling *Saxifraga diversifolia*; and the decidedly creeping rhizome of *P. tenella*, whose fimbriated stipules, green flat flowers, reflexed petals, and curious staminodia, render it decidedly the most abnormal species of the genus hitherto discovered. It is somewhat singular, that though it deviates so remarkably from the typical forms, it does not throw any light upon the affinities of the genus.

PARNASSIA.

§ I. *Capsula* supera, ovoidea. *Staminodia* profunde divisa, segmentis filiformibus glanduloso-capitatis. *Placentæ* lineares secus totam longitudinem ovarii productæ.

1. **PARNASSIA FOLIOSA** (*Hf. & T.*). Caule acute quadrangulo angulis alatis folioso, foliis caulinis rotundato-cordatis sessilibus lobis amplexicaulibus, petalis profunde fimbriatis, stigmatibus subsessilibus.

Hab. Mont. Khasia regione temperata prope Moflong et Nonkreem, alt. 6000–7000 ped.! rarissima. (fl. Sept.) (v. v.)

Herba pro genere robusta, glaberrima, spithamæa, structura floris *P. palustri* accedens. *Folia* radicalia non visa, caulina 6–8, alterna, coriacea, 1 unc. diametr., 5–7 nervia et costata. *Flores* $\frac{1}{3}$–1$\frac{1}{4}$ unc. diametr., albi.

2. *Parnassia palustris*, L. (Exempl. fructif.)

Hab. Tibetia occidentali regione temperata ad Iskardo, alt. 7000 ped.! *T. Thomson*. (v. v.)

Distr. Europa, Asia et America boreali subalpina et subarctica.

§ II. *Capsula* supera, triquetra, late obcordata. *Staminodia* 5–7-fida.

3. **Parnassia Wightiana** (*Wall. Cat.* 116). Foliis reniformibus, reniformi-rotundatisve, petalis plus minusve infra medium fimbriatis. —*Wight & Arn. Prodr.* 35; *Wight, Ill.* t. 21. B; *Ic.* t. 945; *Arnott in Hook. Comp. Bot. Mag.* ii. 315. *P. ornata,* Wall. Cat. 1247; Arn. *l. c.* *P. Schmidii,* Zenker, Plant. Ind. dec. 1. p. 3. t. 5.

Hab. Himalaya occidentali temperata. Kumaon! *Blinkworth.* Mont. Khasia, regione temperata, alt. 5000–6000 ped. frequens! *J. D. H. & T. T.* Mont. Nilgherrie, alt. 7000–8000 ped.! *Wight,* &c. (fl. Aug.) (v. v.)

Variat insigniter statura, foliis apice rotundatis acutisve; petalorum marginibus plus minusve fimbriatis apicibusque erosis integerrimisve; staminodiis 5–7-fidis, segmentis latis angustisve. *Placentæ* basin versus capsulæ.

§ III. *Capsula* supera, triquetra, late obcordata. *Staminodia* 3-loba v. trifida.

4. **Parnassia Mysorensis** (*Heyne in Wall. Cat.* 3754). Foliis radicalibus reniformibus v. rotundato-cordato-reniformibus sinu lato acutis rotundatisve, scapis (sæpissime numerosis) gracilibus, petalis obovato-spathulatis marginibus dentatis (rarius integerrimis), staminodiis elongato-cuneatis apice dilatatis trifidis, capsula subglobosa $\frac{3}{4}$ supera, stylo attenuato brevi, stigmatibus 3–5.—*Wight & Arn. Prodr.* 35; *Arn. in Comp. Bot. Mag.* ii. 315.

β. Filicaulis, scapis filiformibus, foliis ovato-cordatis, petalis angustioribus.

Hab. Mont. Khasia regione temperata, alt. 5000–7000 ped. frequens! *Lobb,* &c. et Montibus Peninsulæ! *Heyne,* &c. (fl. Sept.) (v. v.)

Var. *β.* In sylvis temperatis Himalayæ orientalis prov. Sikkim, alt. 7000–9000 ped.! *J. D. H.* (fl. Aug.) (v. v.)

Herba 4–6-uncialis, plerumque multiflora. *Folia* sub $\frac{1}{2}$ unc. lata. *Scapi* graciles v. subrobusti. *Flores* $\frac{3}{4}$ unc. lati. *Petala* rarius integerrima.

§ IV. *Capsula* supera, triquetra, obcordata. *Placentæ* versus basin loculi. *Staminodia* simplicia, columnæformia, apice discifera.

5. **Parnassia tenella** (*Hf. & T.*). Rhizomate prostrato repente, stipulis fimbriatis, foliis reniformibus profunde bilobis marginibus erosis, petalis spathulatis reflexis viridibus.

Hab. In sylvis temperatis Himalayæ orientalis ad Sikkim, alt. 9000–11,000 ped. inter muscos ad truncos arborum, &c. (fl. August.) (v. v.)

Species singularis, habitu ab omnibus diversa, sed indole florum simillima. *Rhizoma* gracile, $\frac{1}{2}$–2 unc. longum, fibras plurimas emittens, apice folia pauca gerens. *Petioli* graciles, 1–1$\frac{1}{2}$-pollicares, basi stipulis adnatis vaginantibus laceris membranaceis aucti. *Folia* late reniformia, ¾–1 unc. lata, glaberrima, læte viridia, margine tenuiter cartilagineo minute fisso et eroso. *Scapus* foliis duplo longior, tenuis, carnosulus, angulatus, infra florem 5-alatus, alis secus angulos calycis tubi productis. *Flores* virides, inclinati, plani, ¼ unc. diametr. *Calycis* lobi breviter oblongi, obtusi. *Petala* paulo obliqua, margine interdum erosa, v. dentata, supra medium arcte reflexa apice rotundata. *Stamina* 5, filamenta subulata, basi dilatata. *Staminodia* ½ longit. staminum, erecta, crassa, teretia, apice discum scutiformem glandulosum viridem gerentia, stipitibus ima basi paulo dilatatis et una cum staminibus seriem unicum formantibus. *Ovarium* globosum, superum, disco plano insidens, stylo brevi; stigmata 3 divergentia apice truncata. *Capsula* immatura late obcordata stylo conspicuo, triquetra v. trialata, coriacea, indehiscens? *Semina* lineari-oblonga, testa brunnea coriacea, embryone generis.

§ V. *Capsula* semi-supera. *Staminodia* 3-loba v. trifida.

6. Parnassia nubicola (*Wall. Cat.* 1246). Foliis radicalibus ovatis ovato-oblongis cordato-oblongisve, caulino oblongo petiolo brevissimo amplexicauli, petalis anguste spathulatis marginibus erosis v. infra medium fimbriatis, staminodiis superne late dilatatis trifidis, ovarii parte superiore conica, stigmatibus 3 sessilibus.—*Arn. in Comp. Bot. Mag.* ii. 315; *Wight, Ill.* t. 21. C.

Hab. In Himalayæ regione temperata, alt. 6000–12,000 ped., a Sikkim! *J. D. H.*, ad Kashmir! *T. Thomson,* frequens. (fl. Aug.) (v. v.)

Herba 4 unc. ad 1½ pedalem. *Capsula* inclinata semisupera; pars inferior ½-pollicaris obconica, superior hemisphærica coriacea trivalvis valvis apice stylo brevi persistente terminatis, seminibus testa laxa.

7. Parnassia affinis (*Hf. & T.*). Foliis radicalibus ovato-oblongis oblongo-cordatisve obtusis, scapo nudo v. basin versus 1-foliato, petalis obovato-spathulatis marginibus eroso-dentatis, staminodiis cuneato-quadratis obtuse trilobis v. trifidis, capsula semisupera stylo attenuato.

Hab. In Himalayæ orientalis regione temperata et alpina provinciæ Sikkim, alt. 11,000–14,000 ped. (fl. Jul.) (v. v.)

Inter *P. nubicolam* et *P. pusillam* media; a priore differt statura humiliore omnibus partibus minore, staminodiis brevioribus styloque longiore; a *P. pusilla* differt statura triplo majore, staminodiis longioribus quam latis. A *P. oblonga* differt staminodiis, a *P. Mysorensi* forma foliorum et capsulæ.

8. Parnassia pusilla (*Wall. Cat.* 1245). 1–3-pollicaris, foliis radicalibus reniformibus subtus discoloribus, caulino ovato-cordato amplexicauli, petalis late oblongis v. obovato-spathulatis marginibus infra medium parce fimbriatis, staminodiis latioribus quam longis obtuse 3-lobis.—*Arn. in Comp. Bot. Mag.* ii. 315.

Hab. Regione alpina Himalayæ, alt. 10,000–15,000 ped., a Sikkim! *J. D. H.*, ad Kunawur! *Thomson.* (fl. Aug.) (v. v.)

Formæ perpusillæ *P. nubicolæ* simillima, sed forma petalorum et staminodiorum diversa. *Folia* 2–4 lin. lata. *Flores* ¼–½ unc. lati. *Capsula* ut in *P. nubicola,* sed brevior. *Petala* interdum emarginata.

9. PARNASSIA OVATA (*Ledeb. in Mem. Acad. Petersb.* v. p. 528). Foliis radicalibus ovalibus ovali-cordatisve obtusis, scapo gracili, petalis obovato- v. lineari-spathulatis integerrimis, staminodiis elongato-cuneatis trifidis segmentis subulatis erectis.—*P. subacaulis,* Kar. & Kiril.

Hab. In Himalaya occidentali et Tibetia occidentali temperata et alpina, alt. 8000–15,000 ped. Affghanistan! *Griffith.* Kashmir! *Jacquemont.* Kishtwar! Parang! Balti! Gugi! &c. frequens, *T. Thomson.* (fl. Sept.) (v. v.)

Distr. In Siberia trans-baikalensi et Soongaria.

Herba statura variabilis, 1–10-pollicaris. *Folia* parva, ½–1½ poll. longa. *Scapi* plerumque graciles, sæpe aphylli. *Flores* ¼–½ unc. diametr. *Capsula* ut in *P. nubicola,* &c. sed multoties minor.

Nat. Ord. DROSERACEÆ.

Gen. I. DROSERA, *L.*

(Diagnoses ex Planchon in Ann. Sc. Nat. sér. iii. vol. ix.)

1. DROSERA BURMANNI (*Vahl, Symb.* iii. 50). Foliis omnibus radicalibus cuneato-spathulatis, stipulis scariosis, scapis 1–3, pedicellis glaberrimis, calyce 5-partito, stylis 5 indivisis, stigmatibus papilloso-fimbriatis, placentis 5.—*Planch. l. c.* p. 190; *Wight, Ill.* t. 20. A. (excl. fig. stigmatis).

Hab. In Ceylonia! *Macrae,* et Montibus Peninsulæ Nilghiri, G. *Thomson*! Canara! *Plant. Hohenack.* Bengalia! *Wallich.* Himalaya orientali tropica ad Sikkim, alt. 1000 ped! *J. D. H.* Silhet! et Chittagong! *J. D. H. & T. Thomson.* (fl. Nov.) (v. v.)

Distr. Africa occidentali; China; Ins. Philippinis; Borneo; Nov. Zealandia.

2. DROSERA INDICA (*Linn. Fl. Zeyl.* p. 51). Caule simpliciusculo decumbente, foliis sparsis linearibus acuminatis, racemis oppositifoliis 3-paucifloris, calycis laciniis anguste lanceolatis, stylis 3 bipartitis, placentis 3.—*Planch. l. c.*; *Wight. Ill.* i. t. 20. f. C. (excl. fig. stigmatis). Cf. *D. Finlaysoniana,* Wall. Cat. *D. Indicæ* var.? fide *Planchon.*

Hab. In Ceylonia, *Macrae,* &c. Maisor! et Canara! *Wight,* &c. Tenasserim ad Tavoy! *Gomez.* Pegu! *M'Lelland.*

Distr. Africa occidentali! Ins. Philippinis! Australia!

3. DROSERA LUNATA (*Ham. ex D.C. Prodr.* i. 319). Glaberrima, foliis radicalibus fugacissimis, caulinis lunatis longe petiolatis, calycis

lobis subrhombeo-ovatis glaberrimis apice fimbriatis, stylis 3 fimbriato-laceris, capsula 3-valvi.—*Planch. l. c.* 296. *D. peltata,* Wight & Arn. Prodr. i. 34 (non Smith); Wight, Ill. t. 20. D.

Hab. In regionibus subtropicis temperatisque totius Indiæ. In Himalaya tota, alt. 5000–10,000 ped., a Kunawur! *T. Thomson,* ad Sikkim! *J. D. H.* Montibus Peninsulæ a Concan! *Stocks,* ad Nilghiri, *Wight,* &c. In Ceylonia! *Gardner,* &c., necnon Monte Kola in Peninsula Malayana prope Malacca, *Lobb.* (fl. Mai.–Octobr.) (v. v.)

Distr. China! Java!

Gen. II. ALDROVANDA, *Monti.*

1. *Aldrovanda vesiculosa,* Linn. Sp. Pl. 412; Planch. *l. c.* *A. verticillata,* Roxb. Fl. Ind. ii. 113.

Hab. Bengalia inferiore; prope Calcutta! *Roxburgh*; paludibus "Salt-pans" dictis, *T. Thomson.* (fl. ?) (v. v.)

Distr. Gallia australi! Pedemontana! Rossia media, et Lithuania. Exemplaria Bengalensia cum Gallicis omnino conveniunt.

Nat. Ord. PHILADELPHEÆ.

Gen. I. PHILADELPHUS, *L.*

1. *Philadelphus coronarius,* L.

Var. *β. tomentosa.* *P. tomentosus,* Wall. Cat. 3653; Royle, Ill. 216. t. 46. f. 1.

Hab. In Himalaya occidentali temperata, alt. 7000–8000 ped. Garwhal! *Strachey & Winterbottom.* Simla! *Madden,* &c. Kishtwar! *T. Thomson.*

Var. *β.* In Himalaya temperata tota, a Sikkim, alt. 7000–9000 ped.! *J. D. H.,* ad Jamu, alt. 5000–6000 ped.! *T. Thomson.* (fl. Mai., Jun.) (v. v.)

Distr. Europa centrali? Japan!

Gen. II. DEUTZIA.

1. DEUTZIA CORYMBOSA (*Brown in Wall. Cat.* 3652). Foliis ovatis acuminatis lanceolatisve serratis, ramulis corymbisque stellato-puberulis, floribus paniculatim corymbosis, calycis segmentis triangulari-ovatis, petalis late obovatis rotundatisve glabris.—*Royle, Ill.* t. 46. f. 2; *Bot. Reg.* N. S. xxv. *Miscell.* p. 37. xxvi. t. 5.

Hab. In Himalaya temperata tota, a Bhotan! *Griffith,* et Sikkim, alt. 7000–12,000 ped.! *J. D. H.*; ad Kishtwar, alt. 6000–10,000 ped.! *T. Thomson.* (fl. Mai.–Jul.) (v. v.)

2. DEUTZIA STAMINEA (*Br. in Wall. Cat.* 3651, *et in Wall. Plant. As. Rar.* ii. 82. t. 191). Foliis ovato-lanceolatis ovatisve acuminatis serratis supra ramulis paniculisque scaberulis subtus calycibusque cine-

rascentibus, floribus ramulis lateralibus paniculatis, calycis segmentis ovatis apice subulatis, petalis lineari-obovatis oblongisve pubescentibus.—*Lindl. Bot. Reg.* xxxiii. t. 13. Cf. *D. scabra*, Thunb.

Var. *β. Brunoniana*, Wall., floribus majoribus.

Hab. In Himalaya temperata tota. Sikkim, alt. 7000–10,000 ped.! *J. D. H.* Nipal! *Wallich.* Kumaon! 5000–8000 ped., *Blinkworth*, &c. Simla! *Comitissa Dalhousie*, &c. Kashmir! *T. Thomson.* Marri! *Fleming.* (fl. Mai.) (v. v.)

Distr. ? Japan.

3. **Deutzia macrantha** (*Hf. & T.*). Foliis ovatis longe acuminatis irregulariter sinuato-denticulatis ramulisque stellatim puberulis, panicula terminali trichotoma pauciflora, calycis lobis subulatis, petalis elliptico-lanceolatis glabris.

Hab. In Himalaya occidentali temperata. Kumaon, alt. 5500 ped.! *Strachey & Winterbottom.*

Habitus *Philadelphi.* *Folia* 2½–3 unc. longa. *Flores* fere 1 unc. diametro.

Nat. Ord. HAMAMELIDEÆ.

(Conspectus Generum Floræ Indiæ Orientalis.)

1. Corylopsis, *Sieb. & Zucc.* *Calycis* limbus semi-superus, valvatus. *Petala* 5, subvalvata, elongata. *Stamina* 5, squamulis alternantia. *Ovarium* 2-loculare; ovulis solitariis. *Capsula* lignea, endocarpio corneo soluto. *Semina* testa crustacea nitida.—Frutices; foliis *stipulatis, serratis, deciduis*; floribus *præcocibus, amentaceis; amentis nutantibus.*

2. Hamamelis, *L.* *Calycis* limbus semi-superus, valvatus. *Petala* 4, æstiv. involuto-valvata, linearia. *Stamina* 4, squamulis 4 alternantibus, filamentis brevibus, antheris valvula dehiscentibus. *Ovarium* 2-loculare; ovulis solitariis. *Capsula* lignosa, endocarpio corneo soluto. *Semina* testa crustacea nitida.—Frutices *pube stellata*; foliis *stipulatis persistentibus*; floribus *capitatis.*

3. Parrotia, *C. A. Mey.* *Calycis* limbus semi-superus. *Petala* 0. *Stamina* 5–7. *Ovarium* 2-loculare, ovulis solitariis pendulis. *Capsula* coriaceo-lignosa, endocarpio corneo soluto. *Semina* testa crustacea.—Frutices *v.* arbores; foliis *stipulatis, deciduis*; floribus *præcocibus, capitatis*; capitulis *involucratis.*

4. Bucklandia, *Br.* *Flores* polygamo-dioici, in capitula connati. *Calycis* limbus semi-superus, truncatus. *Petala* linearia, æstiv. involuta. *Stamina* 10–14. *Ovarium* 2-loculare, ovulis quovis

loculo 6. *Fructus* multiplex, capsulis semi-exsertis bivalvibus demum liberis. *Semina* quovis loculo 6, infimo solum perfecto; testa coriacea superne in alam producta.—Arbor *elata, glaberrima*; foliis *persistentibus, primum stipulis* 2 *magnis coriaceis deciduis inclusis, vernat. inflexis.*

5. LIQUIDAMBAR, *L.* *Flores* capitati, connati, unisexuales. *Calycis* tubus basi ovario connatus, limbo lobato. *Petala* 0. *Stamina* plurima, filamentis brevibus. *Ovarium* 2-loculare; ovulis plurimis. *Fructus* multiplex; capsulis semi-exsertis bivalvibus demum liberis. *Semina* quovis loculo plurima, infimo solum perfecto; testa marginata.—Arbores *glabræ*; foliis *alternis deciduis* ? *stipulatis.*

6. ANISOPHYLLEA, *Br.* *Flores* hermaphroditi, spicati. *Calyx* superus, 4-partitus, valvatus. *Petala* 4, laciniata, valvato-involuta. *Stamina* 8. *Ovarium* 4-loculare, ovulis solitariis pendulis. *Fructus* drupaceus, abortu 1-spermus.—Arbores; foliis *coriaceis, glaberrimis, 5-nerviis*; floribus *racemosis.*

Gen. I. CORYLOPSIS, *Sieb. & Zucc.*

1. CORYLOPSIS HIMALAYANA (*Griffith, Plant. Cantor, in Trans. As. Soc. Bengal*). **Ramulis petiolis pedunculisque sericeo-tomentosis, foliis obovato-oblongis acutis acuminatisve argute serratis basi cordatis plicatis subtus cano-pubescentibus sericeisve, amentis pendulis, bracteis calycibusque dense sericeis, petalis linearibus albis, calyce fructifero subbaccato, seminibus nitidis.**

Hab. In Himalaya orientali et Montibus Khasia regione temperata, alt. 5000–6000 ped., *Griffith*, &c. (fl. Nov.) (v. v.)

Gen. II. HAMAMELIS, *L.*

1. HAMAMELIS CHINENSIS (*Brown in Abel, Voy.* 374. *cum Icone*). **Stellatim tomentosa, foliis ovato-oblongis acuminatis supra sparse puberulis, floribus subternis, calycis lobis ovatis obtusis, petalis anguste linearibus, capsulis obovatis dense tomentosis.**

Hab. Montibus Khasia regione subtropica prope Nurtiung, alt. 4000–5000 ped., *J. D. H. & T. Thomson.* (fl. Octobr.) (v. v.)

Distr. China!

Gen. III. PARROTIA, *C. A. Mey.*

1. PARROTIA JACQUEMONTIANA (*Dcne in Plant. Jacq.* 73. t. 83). **Foliis orbiculatis obovatisve basi cordatis grosse dentatis supra glabris opacis subtus petiolis pedunculis capsulisque dense stellatim tomentosis, stipulis ovatis oblongisve pubescentibus, involucris ob-**

ovato-rotundatis membranaceis albis integerrimis lobatis serratisve.—*Fothergilla involucrata*, Falconer in Linn. Soc. Proceedings, Febr. 1839, et in Royle, Ill. Introd. xxv.

Hab. Himalaya occidentali temperata; Chamba! et Kashmir! alt. 5000–7000 ped., *T. Thomson*. (fl. Mart.) (v. v.)

Gen. IV. BUCKLANDIA, *Br.*

1. *Bucklandia populifolia*, Br. in Wall. Cat. 7414; Griffith in As. Research. xix. 94. t. 13, 14.

Hab. In Himalaya orientali temperata et subtropica, Nepal! et Sikkim! alt. 4000–7000 ped.! *J. D. H.*, et in Montibus Khasia, alt. 4000–6000 ped.! *Griffith*, &c. (fl. Nov.) (v. v.)

Gen. V. LIQUIDAMBAR, *L.*

1. *Liquidambar Altingia*, Blume, Flor. Jav. fasc. xvii. p. 6. t. 1, 2.—*Sedgwickia cerasifolia*, Griffith in As. Research. xix. p. 98. t. 15, 16.

Hab. In Assam! et Montibus Mishmee! *Griffith*.

Distr. Java!

Gen. VI. ANISOPHYLLEA, *Br.*

1. *Anisophyllea Zeylanica*, Benth. in Niger Flora, 575 & 342.—*Tetracrypta cinnamomoides*, Gardn. & Champ. in Hook. Journ. Bot. i. 314. et v. 378.

Hab. Insula Ceylon, regione tropica!, *Gardner*, &c.

Nat. Ord. RIBESIACEÆ.

Gen. I. RIBES, *L.*

a. *Flores* solitarii.

1. *Ribes Grossularia*, Linn. Wall. Cat. 6835, et in Flor. Ind. ii. 514.—*R. Himalensis*, Royle, Ill. 225.—*R. alpestre*, Dcne in Plant. Jacq. 64. t. 75.

Hab. In Himalaya occidentali temperata. Kumaon, alt. 11,500 ped.! *Webb, Strachey & Winterbottom*. Kunawur, alt. 9000–12,000 ped.! *Jacquemont*, &c. Kashmir! *Falconer*, &c. (fl. Mai.)

Distr. Europa boreali et alpina, Græcia! Caucasus!

b. *Flores* racemosi. *Calycis* tubus brevis, ultra ovarium non longe productus.

2. **RIBES LEPTOSTACHYUM** (*Dcne in Voy. Jacq. Bot.* 65. t. 76; non *Benth. Plant. Hartweg*). Polygamo-dioicum, glanduloso-puberulum et pilosiusculum, foliis parvis ($\frac{1}{2}$–1-pollicaribus) late rotundato-cordatis reniformi-rotundatisve 3-lobis crenato-dentatis, racemis subdensifloris, bracteis linearibus, floribus parvis viridibus, calycis tubo late obconico,

lobis ovato-rotundatis obtusis, baccis parvis glandulosis v. glabratis.—*R. villosum*, Wall. Cat. 6832, et in Flor. Ind. ii. 514; Don, Gen. Syst. Gard. iii. 187.—Cf. *R. orientale*, Poir. et *R. heterotrichum*, C. A. Meyer in Led. Flor. Ross.

Hab. In Himalaya occidentali temperata. Nepal! *Wallich*, et Garwhal, alt. 10,000–11,000 ped.! *Strachey & Winterbottom*; Kashmir, alt. 7000–9000 ped.! *Jacquemont*, &c. In Tibetia occidentali, alt. 8000–14,000 ped. vulgatiss.! *T. Thomson*. Affghanistan! *Griffith*. (fl. Mai., Jun.) (v. v.)

Distr. ? Siberia. ? Persia. ? Soongaria.

Bracteæ pedicellos subæquantes. *Flores* fusci v. luride flavi. *Petala* late obovata, patentia. *Filamenta* brevia, antheris vix longiora. *Stylus* longe bifidus, stigmatibus magnis capitatis.

3. Ribes laciniatum (*Hf. & T.*). Polygamo-dioicum, foliis (1–1½ unc. longis) gracile petiolatis triangulari-ovato-cordatis trilobis lobis argute dentatis acuminatis subtus ramulisque glaberrimis supra sparse puberulis, racemis gracilibus laxifloris folio brevioribus sparse glanduloso-puberulis, bracteis linearibus acuminatis, floribus parvis, calycis tubo late obconico lobis lanceolatis acuminatis fusco-purpureis, antheris sessilibus, baccis glaberrimis parvis.

Hab. In Himalaya orientali temperata. Bhotan! *Griffith*. Sikkim, alt. 10,000–12,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

R. glaciali affine, differt præcipue foliis sublaciniatis, lobis angustioribus, calycisque lobis acuminatis. *Bracteæ* pedicellos graciles subæquantes. *Flores* glaberrimi. *Petala* linearia. *Stylus* longe bifidus, stigmatibus capitatis. *Baccæ* rubræ.

4. Ribes luridum (*Hf. & T.*). Polygamo-dioicum, foliis ramulisque glaberrimis (1 unc. latis) late cordato-rotundatis trilobis lobis obtusis subduplicato-crenato-dentatis, racemis puberulis erectis folio brevioribus, floribus castaneis breve pedicellatis, bracteis oblongo-spathulatis, calycis tubo ovoideo lobis ovato-oblongis obtusiusculis, baccis glaberrimis.

Hab. In Himalaya orientali temperata. Sikkim, alt. 10,000–12,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

R. glaciali affine, differt foliis minoribus latioribus, lobis obtusis, floribus castaneis, bracteisque latioribus. *Frutex* 4-pedalis. *Rami* cortice nigro tecti. *Racemi* subdensiflori. *Flores* breve pedicellati. *Bracteolæ* pedicellos superantes. *Petala* late obovata, patula. *Antheræ* subsessiles. *Stylus* apice bifidus; stigmatibus capitatis.

5. Ribes desmocarpum (*Hf. & T.*). Dioicum, ramulis petiolis racemisque dense glanduloso-pubescentibus, foliis (1½–2 poll. longis) ovato- v. triangulari-cordatis 3-lobis lobis acutis subduplicato-crenatis supra puberulis subtus glanduloso-pubescentibus, racemis multifloris, bracteis linearibus, calycis tubo late campanulato basi conico lobis ovato-oblongis obtusis, baccis glanduloso-pubescentibus.

Hab. In Himalaya orientali temperata. Bhotan! *Griffith.* Sikkim, alt. 10,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Rami cortice fusco glabro, ramulis dense glandulosis. *Racemi* floriferi foliis subæquilongi. *Bracteolæ* pedicellos superantes. *Flores* fusci. *Petala* late obovato-spathulata. *Filamenta* antheris æquilonga. *Stylus* breviter bifidus, stigmatibus capitatis. *Baccæ* breve pedicellatæ subimbricatæ.

6. **Ribes glaciale** (*Wall. Cat.* 6833, *et in Flor. Ind.* ii. 513). Polygamo-dioicum, ramulis foliisque glaberrimis, foliis late triangulari-ovato-cordatis trilobis lobis acutis acuminatisve crenato-serratis, racemis floriferis erectis sparse puberulis, bracteis linearibus, floribus parvis, calycis tubo late obconico lobis oblongis acutiusculis patentibus, baccis parvis glaberrimis pubescentibusve.—*R. acuminatum,* Wall. Cat. 6834.

Hab. In Himalaya temperata, alt. 7000–10,000 ped. vulgaris et sæpissime epiphytica, a Bhotan! *Griffith,* ad Kashmir! (fl. Mai.) (v. v.)

Folia 1–2 unc. longa, interdum supra sparse pilosiuscula, plerumque longe petiolata. *Racemi* elongati. *Bracteæ* pedicellos superantes v. æquantes. *Flores* fusci (an semper?). *Petala* late obovata. *Filamenta* antheris duplo longiora. *Stylus* elongatus, breviter bifidus, stigmatibus capitatis. *Baccæ* rubræ.

c. *Flores* racemosi. *Calycis* tubus ultra ovarium longe productus.

7. **Ribes nigrum** (*L.*). Ramulis foliisque glaberrimis v. puberulis, foliis late ovato-cordatis 3–5-lobis lobis crenato-serratis, racemis breviusculis paucifloris, floribus (magnis) longe pedicellatis puberulis, bracteolis brevibus, calycis tubo late campanulato lobis reflexis obtusis, filamentis subulatis, baccis magnis glaberrimis.

Hab. In Himalaya et Tibetia occidentali temperata. Kunawur, alt. 8000–12,000 ped.! Kashmir! et Dras, alt. 7000–10,000 ped.! *T. Thomson.* (fl. Mai.) (v. v.)

Distr. Europa! et Siberia! usque ad Kamtchatka!

Frutex robustus glaberrimus. *Folia* 2–3 unc. longa. *Flores* virides. *Bracteolæ* pedicellis multoties breviores.—Variat hortis baccis nigris, violaceis, albis.

8. **Ribes Griffithii** (*Hf. & T.*). Ramulis glabris, petiolis gracillimis basi ciliatis, foliis late ovato-rotundatis cordatis 3–7-lobis supra glaberrimis subtus secus nervos pubescentibus lobis argute serratis caudato-acuminatis, racemis longissimis pendulis laxifloris puberulis, bracteis elongatis linearibus oblongisve, floribus magnis, calycis tubo campanulato basi conico lobis lineari-oblongis obtusis reflexis, baccis magnis glaberrimis.

Hab. In Himalaya orientali temperata et subalpina. Bhotan! *Griffith.* Sikkim, alt. 10,000–13,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Species insignis. *Petioli* 2–3 unc. longi. *Folia* 2–3 unc. lata, lobis divaricatis in caudas productis, serraturis angustis, acutis. *Racemi* spithamæi! flexuosi. *Flores* dissiti, glaberrimi. *Bracteolæ* 2–3, pedicellos superantes, subulatæ. *Petala* obovato- v. oblongo-linearia, unguiculata. *Stamina* erecta, filamentis elongatis. *Stylus* bifidus. *Baccæ* pulcherrimæ, ovoideæ, rubræ, acerbissimæ.

9. RIBES RUBRUM (*L.*). Ramulis glaberrimis, foliis longe petiolatis petiolis basi ciliatis ovato-cordatis 3–5-lobis utrinque glaberrimis lobis subacutis grosse crenato-dentatis, racemis elongatis pendulis flexuosis pubescentibus, bracteis minimis recurvis, calycis tubo campanulato basi conico lobis brevibus obtusis, baccis glaberrimis.—*R. Himalense,* Dcne in Plant. Jacq. 66. t. 67, non Royle.

Hab. In Himalaya occidentali temperata, alt. 6000–10,000 ped., frequens a Kumaon! *Thomson,* &c., ad Marri, *Fleming*! (fl. Mai., Jun.) (v. v.)

Distr. Europa! Caucasus! Siberia tota!

Folia 1–3 unc. longa, supra interdum sparse pilosiuscula. *Racemi* foliis æquilongi, laxiflori. *Bracteæ* pedicellis brevibus sæpius breviores. *Flores* magni, flavo-virides, glaberrimi, petalis obovato-spathulatis; staminibus erectis, filamentis elongatis; stylo simplici.

Quid *R. Takare,* Don, Prodr. 208 (indeterminabilis).

Nat. Ord. CRASSULACEÆ.

(Conspectus Generum Floræ Indiæ.)

1. TILLÆA, *L.* *Sepala* 3–5. *Petala* et *stamina* 3–5. *Squamulæ* hypogynæ 0. *Folliculi* 3–5, 2- v. polyspermi.—Herbæ *pusillæ*; foliis *oppositis*; floribus *axillaribus, parvis.*

2. CRASSULA, *L.* *Calyx* 5-partitus. *Petala, squamulæ* hypogynæ, et *stamina,* 5. *Folliculi* 5, oligo- v. polyspermi.—Herbæ *v.* frutices; foliis *alternis oppositisve*; floribus *albis roseisve, sæpius paniculatis.*

†3. BRYOPHYLLUM, *Salisb.* *Calyx* inflatus, 4-fidus, valvatus. *Corolla* hypocrateriformis, limbo 4-lobo. *Stamina* 8, corollæ inserta. *Glandulæ hypogynæ* oblongæ. *Folliculi* 4, liberi, polyspermi.—Suffrutices *erecti, carnosi*; foliis *oppositis, simplicibus v. imparipinnatis*; cymis *paniculatis.*

4. KALANCHOE, *Adans.* *Calyx* 4–5-partitus. *Corolla* hypocrateriformis; limbo 4–5-fido. *Stamina* 8–10, corollæ inserta. *Glandulæ hypogynæ* lineares. *Folliculi* 4–5, polyspermi.—Herbæ *basi frutescentes*; ramis *erectis*; foliis *oppositis, simplicibus pinnatisectisve*; floribus *cymoso-paniculatis.*

5. UMBILICUS, *D.C.* *Calyx* 4–5-partitus. *Corolla* campanulata,

4–5-fida. *Stamina* 5–10, imæ corollæ inserta. *Squamulæ hypogynæ* obtusæ. *Folliculi* 5, polyspermi.—Herbæ; foliis *rosulatis alternisve simplicibus*; floribus *racemosis, rarius cymosis.*

6. SEMPERVIVUM, *L.* *Calyx* 6–20-partitus. *Petala* 6–20 libera v. basi connata. *Stamina* 12–40. *Squamulæ hypogynæ* apice truncatæ, dentatæ v. laceræ. *Folliculi* 6–20, polyspermi.—Herbæ, *rarius* suffrutices, *acaules v. caulescentes*; foliis *plerisque rosulatis*; floribus *cymosis, corymbosis, paniculatisve.*

7. SEDUM, *L.* *Sepala* 4–5. *Petala* 4–5. *Stamina* 8–10, perigyna, alterna petalis inserta. *Squamulæ hypogynæ* integræ v. apice emarginatæ, interdum minimæ v. 0. *Folliculi* 4–5, polyspermi.—Herbæ *erectæ v. diffusæ*; foliis *alternis rarius oppositis*; floribus *cymosis.*

8. TRIACTINA, *Hf. & T.* *Sepala* 5, minima. *Petala* 5. *Stamina* 10, perigyna, alterna petalis inserta. *Squamulæ hypogynæ* lineares. *Folliculi* 3, ad medium connati, polyspermi.—Herba *carnosula, subramosa*; foliis *alternis v. subverticillatis*; floribus *ramis cymæ laxe foliatæ sessilibus.*

Gen. I. TILLÆA, *L.*

1. *Tillæa pentandra,* Royle, Ill. 222 (nomen tantum); Edgew. in Linn. Trans. xx. 50.

Hab. In Himalaya occidentali tropica, alt. 1000–6000 ped. Kumaon! *Royle,* &c. Simla! et Chamba! *Thomson.* Panjab, ad Peshawur! *Vicary.* Concan! *Herb. Stocks.* Mont. Nilghiri! *Pl. Hohenacker.* Maisor! *Lobb.* (fl. Sept.–Nov.) (v. v.)

Gen. II. CRASSULA, *L.*

1. CRASSULA INDICA (*Decne in Plant. Jacq.* 61. t. 73. f. 1). Glaberrima, foliis radicalibus rosulatis spathulatis, caulinis alternis, cymis paniculatis.—*Sedum paniculatum,* Wall. Cat. 7227.

Hab. In Himalaya temperata, alt. 4000–8000 ped.! Bhotan! *Griffith.* Kumaon! Garwhal! Simla! *Blinkworth,* &c. Kunawur! *Jacquemont.* (fl. Aug.) (v. v.)

†Gen. III. BRYOPHYLLUM, *Salisb.*

†1. *Bryophyllum calycinum,* Salisb. D.C. Prodr. iii. 396; Wall. Cat. 7205; Wight in Hook. Bot. Misc. iii. 100, Suppl. t. 1; Wight & Arn. Prodr. 360. *Cotyledon rhizophylla,* Roxb. Fl. Ind. ii. 456. *C. calycina,* Roth, nov. sp. 217.

Hab. Locis calidis Bengaliæ, utriusque Peninsulæ Indiæ, frequens, ex Africa tropica? introducta. (fl. Dec.) (v. v.)

Gen. IV. KALANCHOE, *Adans.*

1. KALANCHOE VARIANS (*Haworth in Phil. Mag.* N. S. vol. ix. 1829, p. 302). Glaberrima, foliis glaucis crenatis obtusis inferioribus simplicibus ovatis supremis trifoliolatis, panicula subcorymbosa, sepalis lineari-ovatis lanceolatisve acuminatis, corollæ lobis acuminatis.—*Wall. Plant. As. Rar.* ii. 53. t. 167, sub nom. *K. subamplectens,* Cat. 7222.

Hab. In Himalaya tropica, alt. 1000–4000 ped. Simla! *Webb, Thomson.* Kumaon! *Wallich, Strachey & Winterbottom.* Nipal! *Wallich.* Sikkim! *J. D. H.* Burmah! *Wallich.* (fl. Dec.) (v. v.)

2. KALANCHOE GRANDIFLORA (*Wall. Cat.* 7226). Glaberrima glauca, foliis obovatis, cymis laxe corymbosis, sepalis magnis ovatis oblongisve acutis, corollæ lobis ovalibus apice uncinatis.—*Wight & Arn. Prodr.* 359. *K. Wightiana,* Wall. Cat. 7225.—An var. *K. varians?*

Hab. Montibus Peninsulæ! regione tropica, *Wight,* &c. (fl. Dec.-Mai.)

3. KALANCHOE FLORIBUNDA (*Wight & Arn. Prodr.* 359). Superne glanduloso-pilosa, foliis superioribus alternis lanceolatis crenatis, cymis paniculatis rarius elongatis, floribus racemosis, sepalis subulatis, petalis oblongis mucronatis.—*K. spathulata,* Wall. Cat. 7224, non D.C.

Hab. In Himalaya tropica. Simla! Garwhal! *Thomson.* Bhotan! *Griffith.* Behar monte Parusnath, alt. 4000 ped.! *J. D. H.* Montibus Peninsulæ! regione tropica, *Wight,* &c. Ceylon! *Walker,* &c. (fl. Dec.-Mart.) (v. v.)

4. KALANCHOE LACINIATA (*D.C. Plantes Grasses,* t. 100). Foliis pinnatifido-laciniatis varie sectis lobis lineari-elongatis subserratis dentatisve, sepalis patulis lanceolatis acuminatis, cymis paniculatis.—*D.C. Prodr.* iii. 395; *Wall. Cat.* 7221; *Wight & Arn. Prodr.* 360. *Cotyledon laciniata* et *C. heterophylla?* Roxb. Flor. Ind. ii. 456.

Hab. Bengal ad Patna! *Hamilton.* Montibus Peninsulæ regione tropica! *Roxburgh,* &c. (fl. Dec.)

Distr. Java, Moluccas.

5. KALANCHOE TERETIFOLIA (*Haworth in Wall. Plant. As. Rar.* ii. 53. t. 166). Foliis triangularibus decompositis pedato-tripinnatisectis, petiolis dilatato-subamplectentibus, floribus (parvis) paniculato-corymbosis numerosissimis.—*Wall. Cat.* 7223.

Hab. Birmah, montibus Taong Dong, *Wallich.*

Quid *K. acutiflora,* Haworth, Syn. 109; Andr. Bot. Rep. 560.

Gen. V. UMBILICUS, *D.C.*

1. UMBILICUS OREADES (*Dcne in Plant. Jacq.* 62, *et* U. luteus *in Ic.* 73. f. 2). Annua, glaberrima, caulibus cæspitosis basi ramosis ramis ascendentibus foliosis, foliis (¼ unc. longis) in ramis sterilibus rosulatis

lineari-lanceolatis oblongisve aristato-acuminatis, caulinis linearibus acuminatis teretiusculis, floribus ad apices ramorum 2–3 nutantibus, sepalis erectis oblongis acutis, petalis albis basi connatis ovato-lanceolatis acutis uninerviis paulo brevioribus, staminibus 5, glandulis hypogynis linearibus, carpellis turgidis stylo brevi setiformi.

Hab. In Himalaya occidentali et alpina. Kashmir ad Pyr-Panjal, *Jacquemont.* Kumaon, alt. 14,000 ped.! *Strachey & Winterbottom.*

Herba carnosula, foliis *Sedo trullipetalo,* et floribus *Umbilico spathulato* subsimilis. *Rami* 2–4-unciales. *Flores* pro planta magni, albi, 4–5-meri. *Corolla* membranacea. *Stamina* corollæ æquilonga, basi petalorum marginibus sæpe adnata.

2. **Umbilicus spathulatus** (*Hf. & T.*). Glaberrimus, foliis ad apices propaginum rosulatis late petiolatis spathulatis acutis apiculatisve caulinis alternis lineari-oblongis, floribus subcorymbosis breve pedicellatis, sepalis 4–5 lineari-oblongis corollæ tubo duplo longioribus, corolla straminea profunde 4–5-fida lobis ovato-oblongis obtusis tubo ter longioribus, squamulis hypogynis linearibus apice dilatatis retusis, folliculis 5.

Hab. In Himalaya orientali temperata. Sikkim, alt. 10,000–12,000 ped.! (fl. Aug.) (v. v.)

Annua? *Caulis* repens, ascendens, basi ramos decumbentes (propagines) emittens, 3–4-pollicaris, simplex v. ramosus, foliosus, crassitie pennæ corvinæ. *Flores* subfastigiati, ½ unc. longi, nutantes, demum erecti.—Habitus et folia *Sedum adenotrichum* referunt.

Gen. VI. SEMPERVIVUM, *L.*

1. **Sempervivum acuminatum** (*Dcne in Plant. Jacq.* t. 74. f. 1). Foliis radicalibus densissime rosulatis lineari-lanceolatis spathulatisve aristato-acuminatis glaberrimis, caulinis lineari-oblongis, floribus glabris, sepalis petalisque sub 8 subglandulosis, squamulis hypogynis lineari-oblongis obtusis.—*Sedum Moorcroftianum,* Wall. Cat. 7228, fid. Edgew. in Linn. Trans. xx. 49.

Hab. In Himalaya et Tibetia occidentali temperata et alpina. Garwhal! et Gugi! alt. 10,000–15,000 ped., *Strachey & Winterbottom.* Kunawur! *Jacquemont,* &c. Piti! *Thomson.* (fl. Aug.) (v. v.)

Sepala viridia, ovato-lanceolata, acuminata, corolla ter breviora. *Petala* sub 8, basi connata, ovato-lanceolata, acuminata, dorso alato carinata. *Folliculi* 8, subsetosi, membranacei, stylo filiformi; semina sulcata.

2. **Sempervivum mucronatum** (*Edgew. in Linn. Trans.* xx. 49). Foliis radicalibus densissime rosulatis lanceolatis aristato-acuminatis glaberrimis v. margine ciliatis, caulinis lanceolatis floribusque longe pedicellatis glanduloso-ciliatis, sepalis petalisque sub 8, squamulis hypogynis obovatis retusis rotundatis v. oblique truncatis.—An var. *S. acuminati?*

Hab. In Himalaya occidentali subalpina. Kumaon! et Garwhal! alt. 10,000–12,000 ped.! *Edgeworth, Strachey & Winterbottom.* (fl. Aug.)
Sepala subulato-lanceolata, submembranacea, petalis triente breviora, dense glandulosa. *Petala* basi connata, lineari-lanceolata, aristata, carina dense glanduloso-pilosa. *Stamina* sub 16. *Folliculi* sub 6, stylo filiformi breviusculo.

3. SEMPERVIVUM SEDOIDES (*Dcne in Plant. Jacq.* t. 74. f. 2). Foliis radicalibus rosulatis lineari-oblongis obtusis tenuissime glanduloso-pilosis, caulinis lineari-obovatis, sepalis obovatis obtusis, petalis (sub 8) calycem staminaque superantibus ovatis lanceolatisve acutiusculis, ovariis attenuatis tenuissime glanduloso-pilosis.
Hab. Himalaya occidentali alpina. Kunawur et Kashmir, *Jacquemont.*

4. SEMPERVIVUM ALBUM (*Edgew. in Linn. Trans.* xx. 49). Foliis ciliatis radicalibus rosulatis obcuneatis carnosis, caulinis confertis imbricatis ovatis, sepalis pubescentibus petalis duplo brevioribus, petalis ovatis ciliatis albis.—An var. *S. sedoidis* foliis caulinis majoribus?
Hab. In Himalaya occidentali temperata. Kumaon, alt. 7000–8000 ped.! *Edgeworth.*

Gen. VII. SEDUM, *L.*

The *Sedums* are most abundant in the alpine, subalpine, and temperate regions of the Himalaya; in the former they are a very conspicuous feature of the vegetation of rocky, stony, or otherwise very barren places, where those of the *Rhodiola* section especially form large rounded patches of a deep green colour in spring, becoming a bright or lurid red or purple in autumn; some of them attain 18,000 feet of elevation, which is almost the limit of vegetable life. Though a few species are found as low as 4000 feet in the Western Himalaya, and 6000 in the Eastern, not one has been found in the Khasia Mountains, or in any part of India south of the Himalaya. The genus *Saxifraga* is the only other Himalayan one containing a great number of species which offers at all a parallel case to this, only one of its species being found in the Khasia, and none elsewhere in India.

The following sketch of the Himalayan Sedums requires more indulgence than even the Saxifrages, from the extreme difficulty of limiting the species in a living state, and the still greater one of detecting the characters of the dried ones. We have found it difficult to indicate any one organ as affording good characters throughout large suites of species, or of specimens of a species. Nevertheless they all resolve themselves into very natural groups,

whose characters we have attempted to give. Of all the organs, the rhizome is one of the best-marked; in most of the species, in all indeed of the *Rhodiola* section, it is very large and elongate, sending out few lateral roots, and bearing usually numerous simple annual branches from the axils of membranous bracts towards its apex; these rhizomes root deep amongst the rocks, and are often divided from the very base into several ascending or erect trunks, each of which, bearing flowering stems, cause the individual plants of some species to attain a great size and rounded or hemispherical form. Young specimens of these large-rhizomed species are recognized with great difficulty: they have few prostrate or ascending stems with smaller leaves, and fewer comparatively larger flowers; and we find, that both in collecting and in sorting our specimens, we have invariably been led to regard the seedling and young specimens as very different species from the old. Such seedlings spring up by the banks of rills which have transported the seeds from greater elevations, and as the plants do not under these circumstances attain their proper development, their true origin may long remain unsuspected by the most careful and observing collector.

The *Rhodiola* section have, further, almost always robust branches, are perhaps invariably polygamous, and have rather turgid follicles with recurved apices. The leaves are variable in form and toothing, the outer and inner branches from near the apex of the same rhizome having often more or less different foliage. The cymes of inflorescence are naked or bracteate; in some species they are reduced to one or two flowers. The male flowers are often different-looking from the female, having narrower sepals and petals, which do not grow or dilate after flowering, as the sepals of the female plants sometimes do. The sepals are often unequal in size, most so in the male flower. The hypogynous glands do not afford very good characters, being variable in length and breadth, and in some species they are almost absent.

The remaining species are generally hermaphrodite, but not always so; they have usually more slender follicles with subulate or filiform erect styles.

The most alpine species are liable to excessive variation in stature, and size and colour of flower, from white to deep rose or red purple, and from orange to golden yellow. In most species the stamina are longer than the petals, and they generally preserve their proportionate length to a considerable degree; but frost-bitten specimens are often deceptive, and have sometimes very irregularly-developed petals; the latter are variable in shape in all the species. The number of parts in each floral whorl varies from 4–5 in most species, and the stamens from 8–10. In all, the alternate stamens are inserted on the petals, never more than half-way from the base, but to a very variable degree in many species.

In *Sedum multicaule* the divaricating follicles appear slightly connected at the base (as they are in *S. pallidum*, M.B., and others), which has made us very reluctant to propose the new genus *Triactina* for one of the Eastern Himalayan species whose habit agrees in many respects with that of *S. multicaule*. But the consolidation of the carpels in *Triactina* is complete up to their middle; their number is constantly only 3, which, and its very minute calyx and whorled leaves, together seem to indicate the propriety of keeping it separate. It links the very different and non-crassulaceous-looking American genus *Penthorum* with *Sedum* in a very remarkable manner.

A. RHODIOLA. *Flores* dioici, v. polygami. *Rhizoma* suberectum, crassum, squamatum. *Rami* suberecti, validi, foliosi, simplices. *Cymæ* terminales.

a. *Cymæ* densifloræ, nudæ; ramis non aut vix bracteatis foliatisve.

1. SEDUM RHODIOLA (*D.C. Prodr.* iii. 401). Foliis sessilibus obovatis oblongisve serrato-dentatis, cyma congesta composita, floribus 4–5-meris breve pedicellatis flavidis, squamulis hypogynis late lineari-oblongis obtusis, stylo recurvo, stigmate discoideo.—*Led. Flor. Ross.* ii. 179.

Hab. In Himalaya et Tibetia occidentali subalpina et alpina; frequens, a Garwhal! ad Kashmir! alt. 12,000–17,000 ped., *Strachey & Winterbottom*, &c. (fl. Jul.) (v. v.)

Distr. Terris arcticis totis! et montibus Europæ! Asiæ! et Americæ borealis!

Variat insigniter statura, latitudine foliorum et magnitudine florum. *Flores* interdum gracile pedicellati. *Calyx* petalis brevior, interdum brevissimus. *Petala* lineari-lanceolata v. anguste linearia. *Stamina* petalis 2–3plo longioribus. *Glandulæ hypogynæ* interdum oblique trifidæ.

2. SEDUM HETERODONTUM (*Hf. & T.*). Ramis robustis, foliis sessilibus basi rotundatis cordatis v. auriculato-bilobis ovatis grosse irregulariter inciso-dentatis, cyma densissime congesta capitata, floribus 4-meris sessilibus roseis?, squamulis hypogynis ut in *S. Rhodiola*, stylo recurvo, stigmate parvo.—An forma *S. Rhodiolæ*?

Var. *a.* Foliis basi non aut vix cordatis profunde dentatis.

Var. β. Foliis basi auriculato-bilobis, minus dentatis.

Hab. In Himalaya occidentali temperata et alpina. Var. α. Kunawur! Kishtwar! et Kashmir! alt. 8000–12,000 ped., *T. Thomson, Lance.* Var. β. Kishtwar, alt. 12,000–14,000 ped.! *T. Thomson.* (fl. Aug.) (v. v.)

Statura elatior quam *S. Rhodiola*; folia multo latiora, grosse eroso-dentata; flores densius congesti sæpius in globum aggregati, juniores virides demum rosei? v. rarius flavi? *Sepala, stamina* et squamulæ hypogynæ variabiles.

3. **Sedum crenulatum** (*Hf. & T.*). Ramis crassis, foliis subsessilibus imbricatis ovato- v. obovato-oblongis crenulatis, cymis sessilibus dense congestis foliis supremis involucratis, floribus 4–5-meris, pedicellis longitudine calycis, sepalis anguste linearibus, glandulis hypogynis lineari-oblongis obtusis, stigmatibus discoideis.

Hab. In Himalaya alpina. Kumaon, 12,000 ped.! *Blinkworth, Strachey & Winterbottom.* Nepal? *Wallich.* Sikkim, alt. 14,000–18,000 ped. vulgatissimum! *J. D. H.*; et in Tibetia occidentali alpina, Gugi, 16,800 ped.! *Strachey & Winterbottom.* (fl. Aug.) (v. v.)

Rhizoma elongatum, crassitie pollicis et ultra. *Rami* numerosissimi, ascendentes, robusti, 3–5 poll. longi. *Folia* $\frac{1}{3}$–$\frac{1}{2}$ unc. longa. *Flores* 4–5-meri, rarius hermaphroditi. *Sepala* sæpe purpurea. *Petala* rosea, in exemplaribus e Kumaon flava?

b. *Cymæ* laxifloræ v. paucifloræ, ramulis non aut raro foliatis, interdum unifloris, v. floribus solitariis.

4. **Sedum Tibeticum** (*Hf. & T.*). Rhizomate ramis vetustioribus onusto, caulibus erectis graciliusculis, foliis ($\frac{1}{3}$–$\frac{1}{2}$-pollicaribus) sessilibus crassis semiteretibus? lineari-oblongis acutis obtusisve integerrimis obscure dentatis, cymorum ramis (fructu) distinctis, folliculis turgidis apice uncinato-recurvis.

Hab. In Himalaya et Tibetia occidentali alpina. Kunawur ad Werang! et Ladak! alt. 12,000–16,000 ped.! *T. Thomson.* Gugi! *Strachey & Winterbottom.* Affghanistan! *Griffith* (1684). (fl. Jun., Jul.) (v. v.)

Rhizoma crassitie pollicis. *Rami* interdum basi decumbentes v. ascendentes, crass. pennæ columbinæ. *Folia* subtus convexa. *Flores* rubri?

5. **Sedum Stracheyi** (*Hf. & T.*). Ramis gracilibus curvis, foliis parvis ($\frac{1}{4}$–$\frac{1}{3}$-pollicaribus) sessilibus planis ovatis ovato-oblongisve obtusis crenatis subsinuatisve, cymis parvis, floribus pedicellatis, petalis calyce duplo longioribus, glandulis hypogynis lineari-oblongis emarginatis, folliculis subturgidis apice recurvis.

Hab. In Tibetia occidentali alpina. Piti! Parang! Nubra! &c., alt. 13,000–17,000 ped., *T. Thomson & H. Strachey* (fl. Jul.) (v. v.)

S. crenulato affine sed rhizomate ramisque gracilioribus, foliis floribusque minoribus.—*Rhizoma* crassitie pennæ anserinæ, squamis apicem versus $\frac{1}{4}$ unc. latis. *Rami* 4–6 unc. longi. *Folia* pallide viridia. *Cymæ* $\frac{1}{2}$–$\frac{2}{3}$ unc. latæ, densifloræ. *Sepala* purpurea. *Petala* fl. ♂ alba v. rosea; fl. ♀ rosea v. purpurea. *Folliculi* $\frac{1}{5}$–$\frac{1}{4}$ unc. longi.

6. SEDUM QUADRIFIDUM (*Pallas, It.* iii. *App.* 730. t. 6. f. 1). Humile, rhizomate crassissimo, ramis brevibus ascendentibus erectisve, foliis confertis teretiusculis obtusis v. acutis ($\frac{1}{6}$–$\frac{1}{4}$ unc. longis), cyma 6–8-flora, floribus 4–5-meris breve pedicellatis, folliculis apice recurvis, glandulis hypogynis subquadratis retusis emarginatis truncatisve.

Var. *α*. Glaberrima, foliis obtusiusculis, cymis 6–8-floris.

Var. *β*. Glaberrima v. puberula, foliis acutiusculis marginibus sicco recurvis, ramis 1–2-floris.

Var. *γ*. *Scoparia*; rhizomate abbreviato crassissimo, ramis densissime confertis, foliis glaberrimis lineari-teretiusculis subacutis, floribus solitariis sessilibus.—An species distincta?

Var. *δ*. *Coccinea*; rhizomate crassissimo, ramis perplurimis foliisque patenti-recurvis subacutis acuminatisve glanduloso-puberulis marginibus sicco recurvis, cymis densifloris v. laxifloris.—*S. coccineum*, Royle, Ill. 223. t. 48.

Var. *ε*. *Acuminata*; puberula, rhizomate crassissimo, ramis perplurimis 2-pollicaribus gracilibus, foliis subulato-lanceolatis, acuminatis, marginibus planis.

Hab. In Tibetia et Himalaya alpina, alt. 13,000–18,000 ped. (fl. Jul., Aug.) (v. v.)

Var. *α*. Gugi, alt. 15,000 ped.! *Strachey & Winterbottom*. Kishtwar! et Zanskar! alt. 14,000–16,000 ped., *T. Thomson*.

Var. *β*. Kunawur! et Kishtwar! alt. 13,000–16,000 ped., *T. Thomson*.

Var. *γ*. Sikkim, alt. 16,000–18,000 ped.! *J. D. H.*

Var. *δ*. Kishtwar, 15,000–16,000 ped.! *Herb. Royle, T. Thomson*.

Var. *ε*. Kumaon! *Blinkworth*; Garwhal, alt. 10,500 ped.! *Strachey & Winterbottom*.

Distr. Rossia et Siberia arctica! Montibus Altai! Baikal et Dahuriæ!

Planta variabilis, cujus exemplaria juniora rhizomate nondum incrassato ramisque paucis ascendentibus ab vetustioribus primo intuitu diversissima apparent. *Flores* purpureæ, parvæ. *Stamina* plerumque petalis longiora, sed interdum (floribus vere gelatis?) abbreviatis.

c. *Cymæ* laxifloræ; ramis foliosis, v. floribus folio bracteatis.

7. SEDUM HIMALENSE (*Don, Prodr.* 212). Rhizomate crasso, ramis erectis ascendentibusve foliosis, foliis planis ($\frac{1}{3}$–$\frac{2}{3}$-pollicaribus) obovato- v. oblongo-cuneatis lanceolatisve acutis acuminatisve apices versus dentatis, cymis evolutis foliosis, floribus pedicellatis ♂ planis, petalis lanceolatis sordide purpureis stamina subæquantibus, glandulis hypogynis atratis late triangularibus, folliculis turgidis apice recurvis.—

D.C. Prodr. *S. Himalayanum*, Wall. Cat., et *S. hypericifolium*, Wall. Cat.; in part. cf. *S. atropurpureum*, Turcz.

Hab. In Himalaya centrali et orientali alpina. Nipal! *Wallich.* Sikkim, alt. 13,000–17,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Rami 6–14 unc. alti, folia superiora ramulique cymæ glaberrimi v. puberuli. *Flores* ♂ $\frac{1}{6}$–$\frac{1}{4}$ unc. lati. *Sepala* subulata, petalis dimidio breviora. *Folliculi* atro-purpurei, $\frac{1}{4}$ unc. longi.

8. Sedum bupleuroides (*Wall. Cat.* 7229). Ramis graciliusculis elongatis, foliis polymorphis ($\frac{2}{3}$–2 pollicaribus) ovatis orbicularibus ovato-oblongisve acutis integerrimis basi rotundatis cordatis v. auriculato-bilobis, cyma effusa ramis divaricatis effusis foliosis, floribus ♂ planis sessilibus pedicellatisve, petalis lanceolatis atro-purpureis staminibus longioribus, glandulis hypogynis late cuneato-quadratis retusis lobatisve, folliculis turgidis apice uncinato-recurvis.

Hab. In Himalaya centrali et orientali subalpina et alpina. Nipal! *Wallich.* Sikkim, alt. 10,000–14,000 ped.! *J. D. H.* (fl. Jul. August.) (v. v.)

Rhizoma breve. *Caules* elongati, glaberrimi v. apices versus ramulique cymæ puberuli. *Cyma* laxa, dichotoma, ramosa, foliosa, 2–4 unc. diametro. *Glandulæ* hypogynæ magnæ, atro-purpureæ.

9. Sedum elongatum (*Wall. Cat.* 7233). Rhizomate brevi crasso, ramis paucis elongatis, foliis (1–2 pollicaribus) sessilibus petiolatisve cuneato-oblongis obovatis lanceolatisve supra medium obtuse dentatis crenatisve, cymis effusis dichotomis ramosis, ramis divaricatis foliosis elongatis, floribus ♂ planis gracile pedicellatisve, petalis lanceolatis atro-purpureis staminibus brevioribus, glandulis hypogynis late cuneato-quadratis bilobis, folliculis turgidis apice subhamato-recurvis.

Var. *α*. Foliis petiolatis.

Var. *β*. Foliis lineari-oblongis basi lata subcordata sessilibus.—An species distincta?

Hab. In Himalaya temperata. Kumaon! *Blinkworth*; *Strachey & Winterbottom.* Nipal! *Wallich.* Sikkim, alt. 10,000–12,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Var. *β*. Kumaon! *Blinkworth.*

Rhizoma breve. *Caules* 1, v. pauci elongati, pedales et ultra. *Folia* sicca pro genere submembranacea, latitudine varia, pallide viridia. *Cyma* late divaricatim ramosa.—*S. bupleuroidi* subsimilis, sed staminibus petalis longioribus.

10. Sedum fastigiatum (*Hf. & T.*). Rhizomate crasso, ramis plurimis erectis ascendentibusve, foliis patulis ($\frac{1}{4}$–$\frac{1}{3}$ pollicaribus) linearibus teretiusculis acutis obtusisve, cymis 3–8-floris simpliciusculis, ramulis brevibus, pedicellis foliatis, petalis suberectis linearibus stamina æquantibus, glandulis hypogynis in fl. ♀ quadratis, in fl. ♂ lineari-oblongis, folliculis turgidis apicibus brevibus recurvis.

Hab. Himalaya orientali alpina. Sikkim, alt. 14,000–17,000 ped.! (fl. Aug.) (v. v.)

S. quadrifido affine sed majus, cymarum ramis pedicellisve florum 1-foliatis, et floribus folliculisque multo majoribus. *Rhizoma* crassitie digiti, perpendiculare. *Rami* plantæ ♂ graciles, 3-pollicares; in plant. ♀ robustiores, 4–5 pollicares. *Glandulæ* hypogynæ ut videtur valde variabiles, in fl. ♀ florentes longiores quam latæ sed post anthesin latiores quam longæ; in plant. ♂ semper longiores, apice truncatæ v. lobulatæ.

11. SEDUM HUMILE (*Hf. & T.*). Rhizomate pro planta crassissimo ramis vetustis dense scopario, ramis brevibus decumbentibus v. suberectis (pollicaribus), foliis linearibus lineari-oblongisve obtusis, floribus pro planta magnis ad apices ramorum solitariis v. 2–3 breve pedicellatis, 4–5-meris, sepalis ovatis subulatisve obtusis, petalis lanceolatis stamina subæquantibus, glandulis hypogynis late quadratis, folliculis turgidis, stylo recurvo.

Hab. In Himalaya orientali alpina. Sikkim, alt. 14,000–16,000 ped.! *J. D. H.* (fl. August.) (v. v.).

Proxime affine *S. quadrifido* et *S. fastigiato*; a priore differt floribus majoribus, foliis latioribus, a *S. fastigiato* statura humili, sepalis latioribus, floribusque minoribus.

12. SEDUM CORIACEUM (*Wall. Cat.* 7328). Rhizomate crasso, cyma foliisque utrinque puberulis, foliis planis obovatis ($\frac{1}{3}$ unc. longis), cyma paucifoliata.

Hab. Nipal! *Wallich.*

S. Stracheyi simile sed totum puberulum, foliis obovatis et cyma pauciflora.

B. *Flores* hermaphroditi, rarius imperfecti. *Folliculi* subpedicellati. *Styli* fere recti, graciles, non aut vix recurvi. *Rhizoma* crassum, elongatum, perpendiculare v. horizontale.

13. SEDUM CRASSIPES (*Wall. Cat.* 7234). Ramis numerosis spithamæis simplicibus suberectis graciliusculis, foliis patulis planis anguste linearibus remote dentatis, cyma densiflora foliis involucrata, pedicellis brevibus bracteatis, floribus majusculis pallidis, petalis lanceolato-spathulatis staminibus paulo brevioribus, glandulis hypogynis brevissimis subquadratis, folliculis lanceolatis, stylo filiformi-subulato.

Hab. In Himalaya subalpina et alpina. Garwhal, alt. 10–500 ped.! *Strachey & Winterbottom.* Nipal! *Wallich.* Sikkim, alt. 12,000–16,000 ped.! *J. D. H.* (fl. Jul.–Sept.) (v. v.)

Plantæ juniores humiles, rhizomate parvo, ramis decumbentibus 2–4 pollicaribus, foliis $\frac{1}{4}$–$\frac{1}{2}$ pollicaribus, integerrimis dentatisve; vetustiores rhizomate crassitie pollicis, ramis spithamæis et ultra. *Folia* suprema cymam superantia. *Petala* straminea. *Flores* interdum unisexuales.

14. SEDUM LINEARIFOLIUM (*Royle, Ill.* 222. t. 48). Rhizomate ramoso, ramis breviusculis glabris glanduloso-pubescentibusque, foliis (⅓ pollicaribus) linearibus dentatis, floribus subsolitariis (magnis!) petalis patulis lanceolatis acuminatis stamina superantibus, glandulis hypogynis quadratis retusis, folliculis subturgidis, stylo gracili.

Hab. In Himalaya occidentali temperata, Kumaon! *Royle.*

Rhizoma crassitie digiti minoris. *Rami* pollicares et ultra. *Flores* 1–3, expansi ½–⅔ unc. diametro! *Petala* rubra? sepalis viridibus vix duplo longiora.

15. SEDUM PAUCIFLORUM (*Edgew. Linn. Trans.* xx. 49). Rhizomate crassissimo, ramis gracilibus glaberrimis, foliis linearibus integerrimis v. apices versus paucidentatis, cymis 6–8-floris, floribus pedicellatis bracteatis, sepalis ovatis, petalis ovato-lanceolatis stamina superantibus, glandulis hypogynis parvis orbiculari-quadratis, folliculis subturgidis, stylo gracili. *S. mucronatum,* Edgew. *l. c.*

Hab. Himalaya occidentali temperata. Kumaon, alt. 8000–10,000 ped.! *Royle, Edgeworth,* &c. (fl. Jul.)

S. linearifolio, Royle, affine; differt præcipue cyma 6–8-flora rarius pauciflora, sepalis brevioribus ovatis. *Antheræ* mucronatæ et muticæ in eodem specimine (mucrone verisimiliter deciduo).

16. SEDUM TRIFIDUM (*Wall. Cat.* 7230). Rhizomate breviusculo crasso, ramis gracilibus, foliis 1–3 pollicaribus lineari-lanceolatis spathulatisve late petiolatis grosse serratis sinuato-pinnatifidis lobatisve lobis obtusis, cymis ramosis foliatis, floribus pedicellatis, sepalis subulato-lanceolatis, petalis lineari-lanceolatis stamina subæquantibus, glandulis hypogynis quadratis, folliculis stylo gracili. *S. sinuatum,* Royle, MSS. Ill. p. 222; Edgew. in Linn. Trans. xx. 47.

Hab. In Himalaya temperata, alt. 6000–10,000 ped., rupibus et truncis arborum epiphytica; a Simla! *Comta. Dalhousie,* ad Sikkim! *J.D.H.* (fl. Aug.) (v. v.)

Planta valde variabilis. *Rhizoma* sæpe deforme. *Rami* spithamæi ascendentes. *Folia* interdum late obovato-spathulata. *Flores* plerumque rosei, sæpius remoti, interdum foliis lobatis bracteati.

17. SEDUM WALLICHIANUM (*Hook. Ic. Plant.* t. 604). Rhizomate crasso elongato, ramis plurimis erectis, foliis sessilibus (pollicaribus) lineari-lanceolatis grosse serratis v. interrupte pinnatifidis supremis cymam superantibus, cymæ ramis breviusculis foliatis, petalis suberectis linearibus staminibus æquilongis, glandulis hypogynis cuneato-quadratis late truncatis, folliculis angustis rectis, stylo gracili suberecto. *S. asiaticum,* Wall. Cat. 7239, B. in part. non D.C.

Hab. In Himalaya occidentali subalpina. Kumaon, alt. 10,000–12,000 ped.! *Blinkworth*; *Strachey & Winterbottom,* &c.

Glaberrimum. *Rami* spithamæi, crassitie pennæ columbæ. *Folia* carnosula, acuta, infra medium integerrima v. serrata, interdum interrupte pinnatifida lobata v. dentata. *Cyma* planiuscula, sed non densiflora, foliis supremis involucrata. *Flores* pedicellati v. sessiles. *Sepala* linearia, petalis $\frac{1}{2}$ breviora.—Habitus *S. imbricati* sed floribus rubris. *S. trifido* simillimum, sed differt rhizomate elongato crasso, ramis vetustis persistentibus, foliis uniformibus floribusque dioicis polygamisve.

18. SEDUM IMBRICATUM (Hf. & T.).

Hab. Himalaya occidentali alpina. Kumaon, alt. 11,000 14,500 ped.! *Strachey & Winterbottom*; *Edgeworth.* Kunawur et Tibetia occidentali! *T. Thomson.* (fl. Jun. Jul.) (v. v.)

Habitus et squamæ rhizomatis *S. Rhodiolæ,* sed flores sæpius hermaphroditi et folliculi angusti pedicellati, stylo gracili recto. Ab *S. Wallichiano* et cæteris hujus sectionis differt squamis rhizomatis, staminibusque petala longe superantibus.

C. Annuæ v. perennes (rhizomate nullo). *Folia* imbricata v. rosulata. *Flores* hermaphroditi.

a. *Folia* rosulata, caulina alterna. *Folliculi* 5, erecti, stylo filiformi recto.

19. SEDUM ROSULATUM (*Edgew. in Linn. Trans.* xx. 48). Superne glanduloso-pilosum (var. β. glaberrima), ramis gracilibus ascendentibus, foliis glabris radicalibus rosulatis petiolatis obovato-spathulatis caulinis parvis sparsis, floribus corymboso-paniculatis pedicellatis, petalis obovato-lanceolatis albis obtusis stamina superantibus, glandulis hypogynis nullis v. minimis, folliculis turgidis membranaceis, stylo gracili filiformi. *S. pyriforme,* Royle, Herb.

Var. β. Glaberrima.

Hab. Himalaya occidentali temperata, alt. 5000–9000 ped.! Kumaon! *Edgeworth.* Simla! Kunawur! & Jamu! *Thomson.* Var. β. Simla! *Comta. Dalhousie.* Kumaon! *Thomson.* (fl. Mai.–Jun.) (v. v.)

Folia $\frac{1}{3}$–$\frac{2}{3}$ poll. longa, apice rotundata obtusa v. apiculata. *Rami* graciles, 2–4 poll. longi. *Flores* albi. *Petala* calyce duplo longiora, apice obtusa, acuta v. oblique truncata. *Folliculi* albi.

20. SEDUM ADENOTRICHUM (*Wall. Cat.* 7231). Superne glanduloso-pilosum, ramis gracilibus, foliis glabris, radicalibus rosulatis carnosis late petiolatis spathulato-cuneatis acutis mucronatisve, caulinis paucis sessilibus, floribus cymoso-paniculatis pedicellatis, pedicellis calycibusque glanduloso-pilosis, petalis lanceolatis acuminatis stamina superantibus, glandulis hypogynis parvis, folliculis membranaceis, stylo gracili; *Edgew. Linn. Trans.* xx. 48.

? Var. β. glaberrima.

Hab. Himalaya occidentali temperata, alt. 3000–8000 ped.! Kumaon! *Blinkworth,* &c. Kashmir! & Jamu! *Thomson.* Marri, *Fleming.* Var. ? β. Bhotan! *Griffith* (fl. Jul. Aug.) (v. v.).

S. rosulato affine et habitu simillimum; differt foliis minoribus crassioribus angustioribus, petalisque acuminatis. *Folia* $\frac{1}{3}$–$\frac{1}{2}$ unc. longa, sicca tenuiter marginata. *Sepala* ovato-lanceolata, petalis dimidio breviora. *Glandulæ hypogynæ* oblongæ, emarginatæ.—Habitus et folia radicalia *Umbilici spathulati.*

21. SEDUM TRULLIPETALUM (*Hf. & T.*). Annuum, glaberrimum, cæspitosum, caulibus sterilibus brevibus foliis parvis ($\frac{1}{4}$-pollicaribus), dense imbricatis ovato-oblongis aristato-acuminatis carnosis, floriferis erectis laxius foliatis apice corymboso-ramosis, cymis densifloris, petalis unguiculatis lamina ovato-lanceolata carinata staminibus æquilongis, glandulis hypogynis minimis oblongis retusis, folliculis in stylum gracilem angustatis.

Hab. In Himalaya alpina. Kumaon, alt. 14,000 ped.! *Strachey & Winterbottom.* Nipalia orientali et Sikkim, alt. 13,000–16,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Species parvula habitu ramosa, foliis *Tillææ*, sicco fusco-rubra, floribus viridibus exemplaribus luxuriantibus numerosissimis; petalis trulliformibus unguiculatis crasse carinatis albo virescentibus (sicco flavescentibus) ab congeneribus Himalaicis valde diversa. *Rami* floriferi 2–5 unc. alti. *Petala* latitudine varia, interdum anguste linearia.

b. *Folia* opposita.

22. SEDUM EWERSII (*Led. Fl. Alt.* ii. 191; *Flor. Ross.* ii. 182, et *Ic. Flor. Ross.* t. 58). Radice crasso multicipite, ramis ascendentibus, foliis oppositis orbiculato-obovatis obtusis integerrimis sinuato-dentatisve supremis sæpius cordatis, cyma ramosa corymbosa multiflora. *S. Gerardianum,* Wall. Cat. 7235. *S. azureum,* Royle, Ill. 222. t. 48. f. 2. *S. rubrum,* Royle, l. c. 222; Edgew. in Linn. Trans. xx. 47.

Hab. In Himalaya occidentali temperata et alpina, alt. 12,000–17,000 ped., a Kumaon! *Strachey & Winterbottom,* ad Kashmir! *Thomson,* necnon in Tibetia occidentali alpina et temperata vulgaris, *Thomson.* (fl. Jun.–August.) (v. v.)

Distr. Sibiria alpina! et Soongaria!

c. *Folia* alterna. *Folliculi* 3–5, maturi divaricati, liberi v. una basi connati.

23. SEDUM PALLIDUM (*M. Bieb. Flor. Taur. Cauc.* i. 353 et iii. 314.) Annuum, pollicare, foliis teretiusculis linearibus obtusis sessilibus patentibus, cyma glandulosa puberula, petalis lanceolatis acuminato-cuspidatis calyce 4-plo longioribus, folliculis maturis divaricatis.—*Led. Flor. Ross.* ii. 185.

Hab. Punjab prope Peshawur! *Vicary.*

Distr. Levant! Tauria! Caucasus! Persia!

24. SEDUM MULTICAULE (*Wall. Cat.* 7232). Glaberrimum, caulibus basi ramosis, ramis ascendentibus, foliis sparsis linearibus teretiusculis acuminatis, floribus in cymas divaricatas seriatis sessilibus, petalis

ovato-lanceolatis longe acuminatis stamina superantibus, glandulis hypogynis parvis truncatis, folliculis 4–5 maturis divaricatis, stylo brevi subulato.—Cfr. *S. Japonicum*, Sieb.?

Hab. Himalaya temperata, alt. 4000–8000 ped. rupibus madidis truncisque arborum epiphytica, prope Peshawur! *Vicary*; Kumaon! & Simla! *Thomson*! *Strachey & Winterbottom*, &c.; Sikkim, *J. D. H.* (fl. Sept.) (v. v.)

Caules 3–6-pollicares, subrobusti. *Folia* $\frac{1}{3}$–$\frac{2}{3}$ unc. longa, aristato-acuminata. *Sepala* petalis subæqualia, viridia, acuminata. *Petala* flava v. interdum rosea?

25. SEDUM PERPUSILLUM (*Hf. & T.*). Annuum? subcæspitosum, glaberrimum, caulibus ramosis ascendentibus, foliis parvis ($\frac{1}{6}$ unc. longis) sessilibus linearibus (teretiusculis?) obtusis, floribus (pro planta magnis) terminalibus axillaribusque 4–5-meris, sepalis oblongis obtusis, petalis oblongis oblongo-lanceolatisve obtusiusculis staminibus æquilongis, glandulis hypogynis punctiformibus, folliculis turgidis post anthesin divaricatis oligospermis, stylo brevi subulato, seminibus muriculatis.

Hab. In Himalaya subalpina et alpina. Garwhal, alt. 15,000 ped.? *Strachey & Winterbottom*, Sikkim, alt. 12,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Caules $\frac{1}{2}$–1 pollicares, graciliusculi. *Folia* sicca plerumque basi saccata. *Flores* pro planta magni, breves, pedicellati, erecti. *Sepala* petalis paulo breviora, viridia. *Petala* alba. *Folliculi* virides, discreti.

Quid Rhodiola Asiatica, *Don. Prodr.* 213, quæ certe non *Sedum Asiaticum*, Wall. Cat., fid. descript. Donii?

Gen. VIII. TRIACTINA, *Hf. & T.*

1. *Triactina verticillata* (Hf. & T.).

Hab. In Himalaya orientali temperata; Sikkim sylvis humidis, alt. 10,000–12,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Planta singularis ob carpella 3 infra medium in capsulam 3-valvem connata, sed affinitate *Sedo multicauli* quam maxime affinis.—*Caules* suberecti, spithamæi et ultra, glaberrimi. *Folia* exemplaribus meis annua, caulina, pauca, verticillata v. alterna, petiolata obovata v. obcordata, integerrima, 1–1$\frac{1}{2}$ unc. longa, sicco membranacea, apice sæpius oblique retusa. Flores axillis foliorum cymæ laxifloræ sessiles, flavi; sepalis brevissimis, petalis ovato-lanceolatis acuminatis stamina subæquantibus; glandulis hypogynis linearibus apice dilatatis; folliculis 3, ad medium connatis, post anthesin divaricatis; *styli* graciles.

On a Monstrous Development in *Habenaria chlorantha*. By the Rev. J. S. Henslow, F.L.S., Prof. Bot. in the University of Cambridge. (Tab. I. B.)

[Read June 16th, 1857.]

The specimen was gathered at Gamlingay in Cambridgeshire on May 25, 1857. The monstrosity to be described was confined to a single (the lowest) flower of the spike, of which about half the flowers were expanded. An enlarged drawing of the flower accompanies the description (Plate I. B, fig. 1).

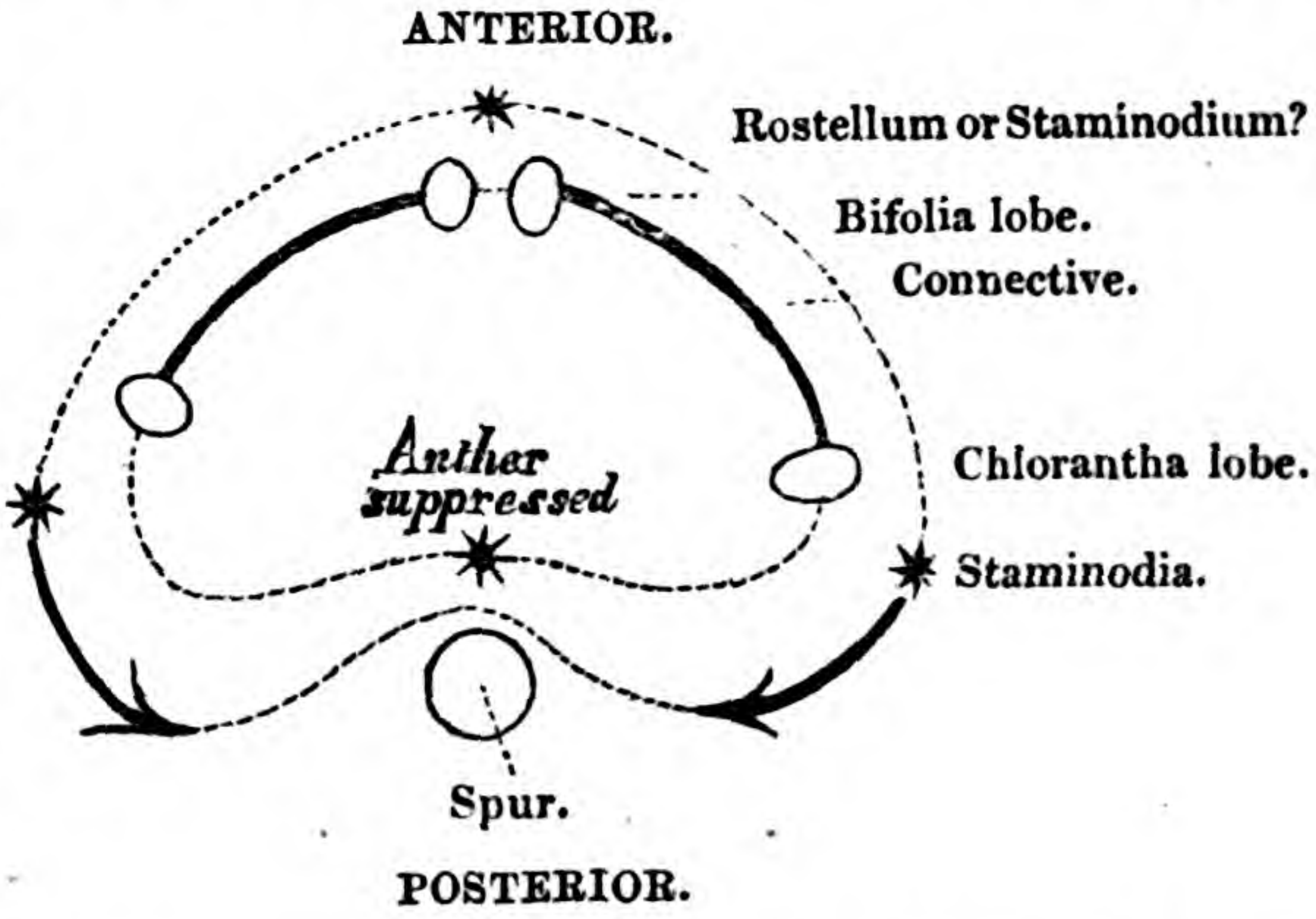
The anterior sepal is united with one of the lateral sepals. This gives a slight obliquity to the flower, especially shown at the base of the lip.

Instead of the usual two anther-lobes on the edges of a widely-expanded connective, there are four anther-lobes here developed. These are associated in pairs, and to all appearance belong to two stamens placed before the lateral petals, or, in other words, alternating with the anterior and lateral outer segments of the perianth. Admitting Mr. R. Brown's view of orchid structure, these stamens must belong to the inner whorl of three, of which the third, contiguous to the lip, is wholly suppressed. If the two anthers in the present specimen were confluent, and their anterior lobes suppressed, we should have the structure exhibited by *H. chlorantha*. But if the posterior lobes were suppressed, the result would offer the general aspect of *H. bifolia*; only the pollen masses in the anterior lobes in this specimen have not their caudiculæ terminated by retinacula. It should seem the development has not been complete; for there is a cavity just below the extremities of the caudiculæ, in which a mass of retinaculum has been formed, as though the supply for two had coalesced, and been cut off by a bursicula-like lobe which intervenes between them and the caudiculæ.

The lateral staminodia (*s'*.) are well formed, and extend a little behind the contiguous fertile stamens. There is also a projection (*s*) resembling a staminodium between the fertile stamens. It is in connexion with the bursicula-like lobe; and the bases of the contiguous anther-lobes are brought down in front of it. It therefore seems to be a staminodium belonging to the same *outer* whorl as the usual two well-marked staminodia! These appearances, if here correctly explained, are suggestive; and I venture to put the following questions:—

1. May not the two anther-lobes (in this genus and others, as

Orchis, *Ophrys*, &c. allied to it), usually regarded as belonging to one, viz. the anterior, stamen of the *outer* whorl, belong rather to two stamens (viz. one to each of the two lateral) of the inner whorl, their other lobe in such cases being abortive? Such a structure would bring these genera into closer affinity with *Cypripedium*, where both lobes of the two lateral stamens of the inner whorl are fertile, whilst the anterior stamen of the outer whorl forms the prominent staminodium of that genus. If this should prove to be the case, the rostellum (where it occurs) would be the representative of the anterior stamen of the outer whorl, and not a process from the stigma, as it is usually regarded. In the present specimen, the lateral staminodia appear connected by a continuous tissue, ranging outside the fertile stamens, with the rostellum-like process rising between them. The distortions or deviations from regularity which are in relation to the formation of lip and spur, seem here connected with the backward extension of the connectives, dragging (as it were) one anther-lobe of the two lateral stamens, whether fertile or barren (*staminodia*), of both whorls towards the lip, whilst the other lobes (the anterior ones) have a tendency to become approximated to each other. Thus, the least obliterated of the anther-lobes (generally termed staminodia) belonging to the two lateral stamens of the outer whorl assume a position a little *behind* the contiguous lateral stamens of the inner whorl.



The entirely suppressed posterior stamens of the inner whorl may be regarded as merged into the spur of the lip. Possibly the entirely suppressed posterior anther-lobes of those outer stamens which produce the lateral staminodia are in the same condition. If we suppose a case in which the posterior stamen of the inner whorl were developed, we might *à priori* anticipate the lip would be replaced by a regularly-formed petal. If I remember rightly, a case of this sort has been recorded and figured in a monstrous variety of *Orchis latifolia*.

Tab. I. B. fig. 1, portion of flower; 2, back, and 3, front view of column; all magnified.

A short Exposition of the Structure of the Ovule and Seed-coats of *Magnolia*.

By ASA GRAY, M.D., F.M.L.S., &c.

[Read November 19th, 1857.]

IN 1848, I maintained, in the 'Genera of North American Plants Illustrated,' vol. i., that the seeds of *Magnolia* were not arillate, but *baccate*, or in other words, that the fleshy coat was the testa. In 1855 this view was criticised by my excellent and most ingenious friend Mr. Miers before the Linnean Society (see Ann. and Mag. Nat. Hist. for May 1855); and he, upon speculative grounds rather than from immediate observations, concluded that "there is no reason to doubt that in *Magnolia* the scarlet envelope is due to a subsequent growth over the primine," and is therefore an arillus. As soon as Mr. Miers' remarks reached me, I re-examined the ovules and young seeds of the plants in question; and the results of new observations by Mr. Sprague and myself were published in Hooker's 'Journal of Botany,' vol. vii. p. 243 (1855), and vol. viii. p. 26. The points which I supposed we had settled by direct observation were:—

1st, That no accessory covering, or arillus, was developed over or upon the primine of the ovule; but

2nd, That the fleshy envelope of the seed represents the primine or outer coat of the ovule; and

3rd, That the bony coat of the seed was represented in the ovule only by the innermost layer of young cells, lining the primine; which cells, multiplying by merismatic division during the growth of the seed, and their walls at length thickening and hardening irregularly, form the crustaceous or bony coat; so that the character of the seed is best expressed by the term "drupaceous."

Drs. Hooker and Thomson, about the same time (Flora Indica, p. 73) also insist that the fleshy coat is the testa; and notice the delicate third coat, closely adherent to the albumen, but without offering any opinion respecting the nature or origin of this and the crustaceous coat*.

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* Drs. Hooker and Thomson remark, that "the lateral position of the raphe with respect to the ovule and seed is worthy of note. It is well represented by Mr. Sprague in the plates of Asa Gray's work just quoted, but is not noticed in the text." If this refers to the pericarpic position of the raphes, that is only mentioned in the description of the ovules, although there is no need of it, as that position is the normal one (*vide* Gen. Ill. p. 10); if it refer to the position of the raphe on the middle of one of the broader sides of the seed, that is also noticed in the description of the seed.

I am not aware of any more recent direct investigation of the seeds of *Magnolia*. But in an elaborate memoir in the 'Transactions of the Linnean Society,' vol. xxii., Mr. Miers argues the question in detail, and reiterates his view formerly expressed, viz. "that the external fleshy envelope must be arilliform, the thick osseous nut must be the testa," &c.; that the raphe, or what he calls the "placentary sheath with its enclosed spiral vessels * * * afterwards becomes expanded by almost imperceptible degrees over the primine, until it finally envelopes it * * * and assumes the form of a distinct scarlet fleshy covering over the testa, being quite arilliform in its structure and appearance." And my excellent opponent goes on to state, that—"The only circumstance that bears any weight in the opposite view of the question, is one which certainly ought to have its due importance, and is one which I have never doubted in the smallest degree; viz. that Dr. Gray has watched the progress of the growth of the seed from the ovule, and could never detect any subsequent or extraneous production over the primine."

This "circumstance" does not appear to have had much weight, perhaps not so much as it was entitled to, considering that I had declared that very easy observation in the living plant sufficed to show that neither the fleshy nor the bony coat of the seed originated in the way Mr. Miers supposed, and had, moreover, asserted that I had arrived, from direct observations, at a different explanation of their nature and origin. Although not disposed to claim any particular authority for the observations made by Mr. Sprague and myself, even while they remain completely uncontradicted by any contrary observation, I may be allowed to express the opinion that a very simple and bare statement of what I said we saw, cannot properly be called an "argument," and still less, "ingenious reasoning." And I might equally object to having the candidly stated and unexpected discovery of the true origin of the bony coat (the only thing of any consequence which we have brought to light), described as an *ingenious substitution of an entirely new view of the subject*, if I were not well assured that my much-respected friend would, on reflection, at once disavow the implication.

My present object is simply to publish a selection from the sketches in which my observations (again repeated the present season) have been recorded by the accurate pencil of Mr. Sprague. They tell their own story, and are naturally entitled to more regard than my descriptive statement. I am indebted to the

Smithsonian Institution for leave to make the present use of the wood-cuts.

Fig. 1 represents a magnified vertical section of a pistil of *Magnolia umbrella*, from a flower-bud about thirty days before anthesis; showing one of the forming ovules, the other being cut away. The ovule at this time is an apparently homogeneous cellular protuberance. Fig. 2 represents the ovule a week or two later in a similar side-view: the two coats now appear as rings or shallow and thickened cups around the base of the nucleus. Fig. 3 is another ovule, as it appeared a few days later. Fig. 4, another a few days later. Fig. 5, one from a nearly full-grown flower-bud. Fig. 6, one from a just-opened blossom. Fig. 7, a vertical section of the same through the middle of the raphe. Fig. 8, a transverse section of the same. In both these sections the conspicuous cord of vessels of the raphe is shown to occupy a position about midway between the outer and inner surface of the primine, or external coat; and this continues to be its position throughout the growth of the seed. Fig. 9 is an outline section of a full-grown ovule, like fig. 7, but on a larger scale, so that the parts may be lettered and compared with the figures beneath: *a*, is the primine or outer coat; *b*, the inner coat; *c*, the nucleus. Fig. 10 represents a slice of the tissue from the left-hand side of fig. 9, through the raphe and primine combined, the inner coat and a little of the nucleus; and fig. 11, a corresponding slice from the right-hand side,—the parts lettered as in fig. 9, viz. *a*, the outer coat; *b*, the inner coat; *c*, a portion of the tissue of

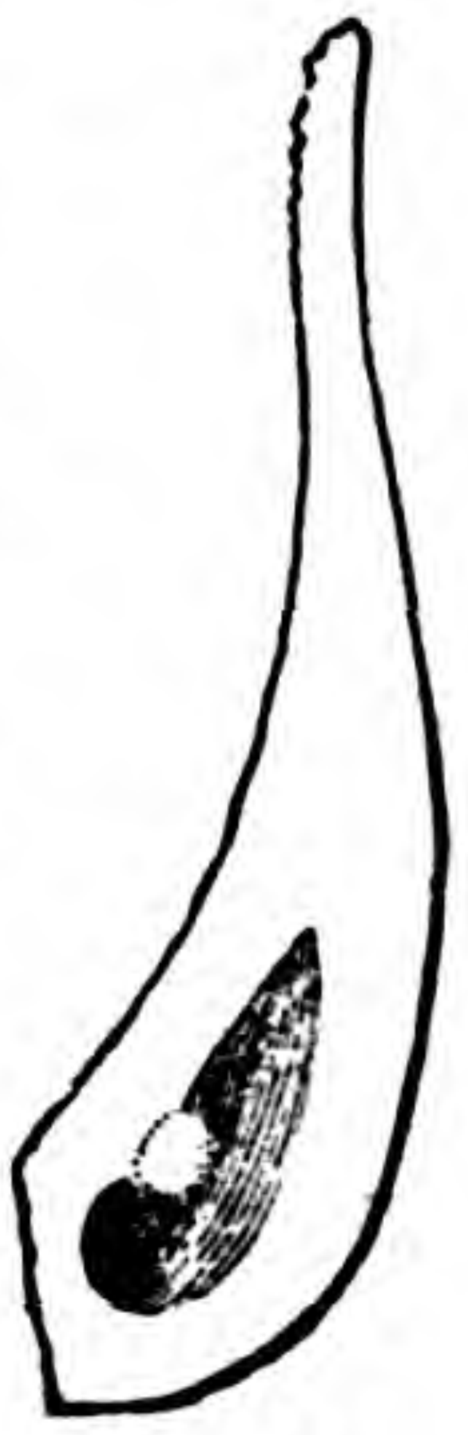


Fig. 1.

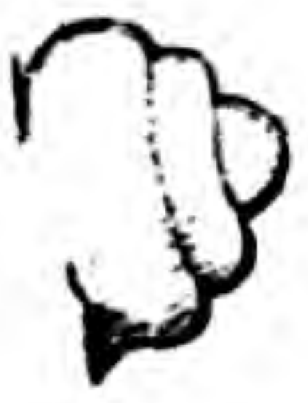


Fig. 2.

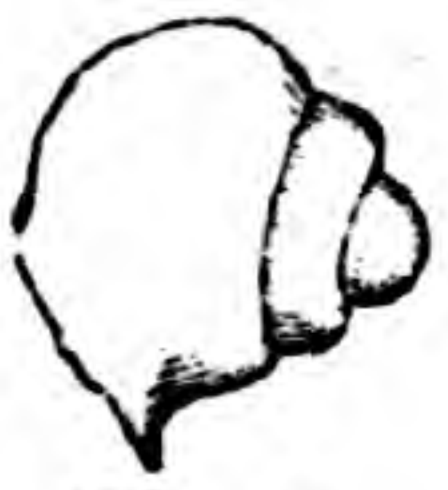


Fig. 3.

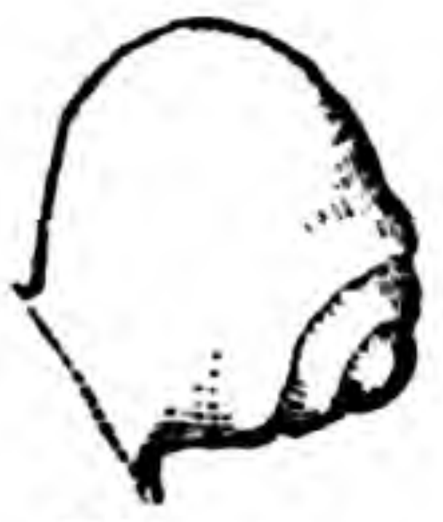


Fig. 4.

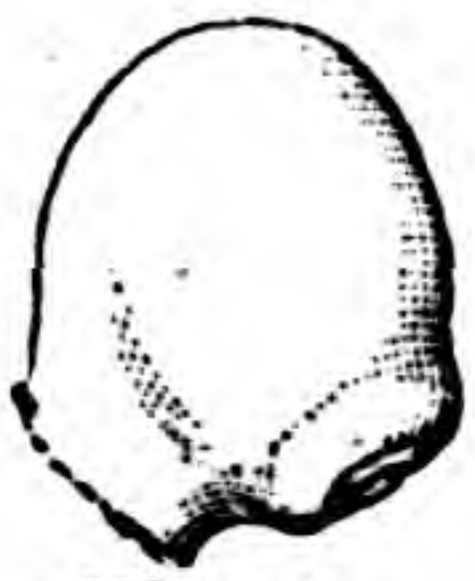


Fig. 5.

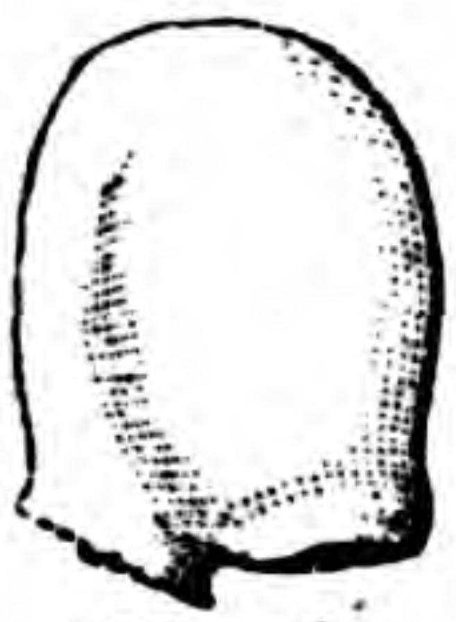
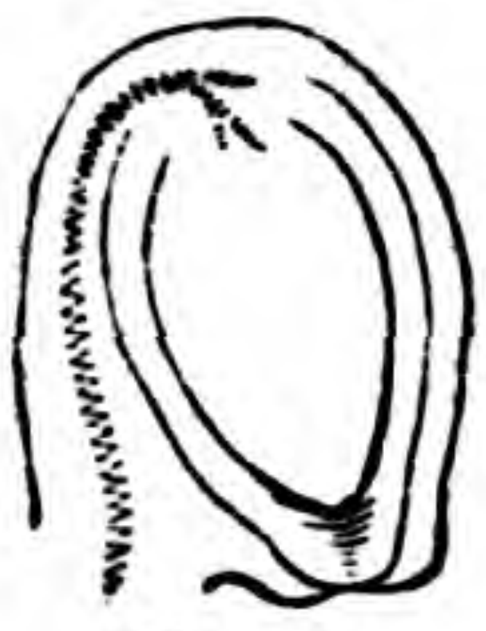


Fig. 6.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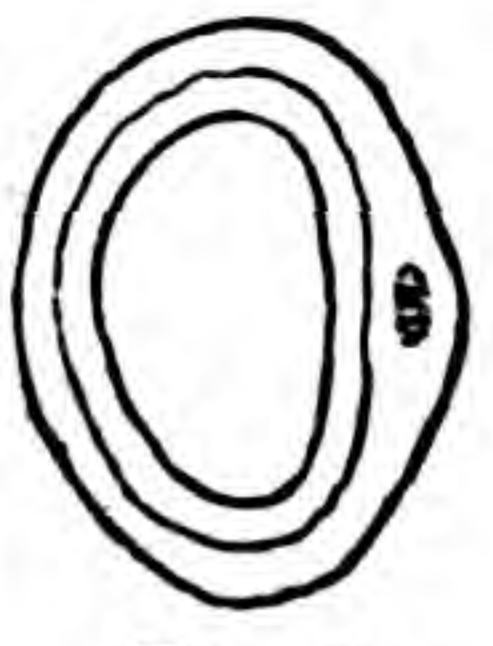
Fig. 8.

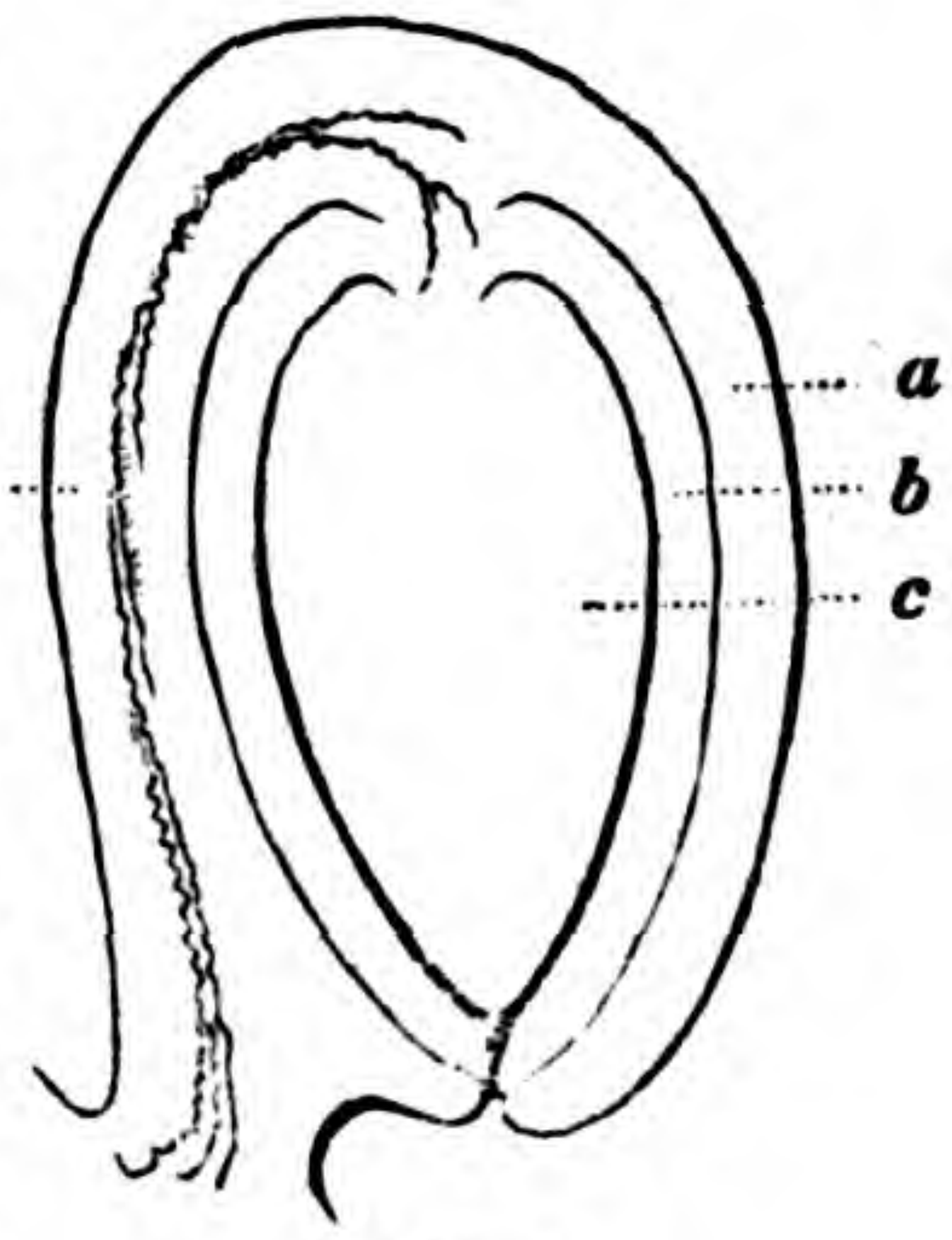

Fig. 9.

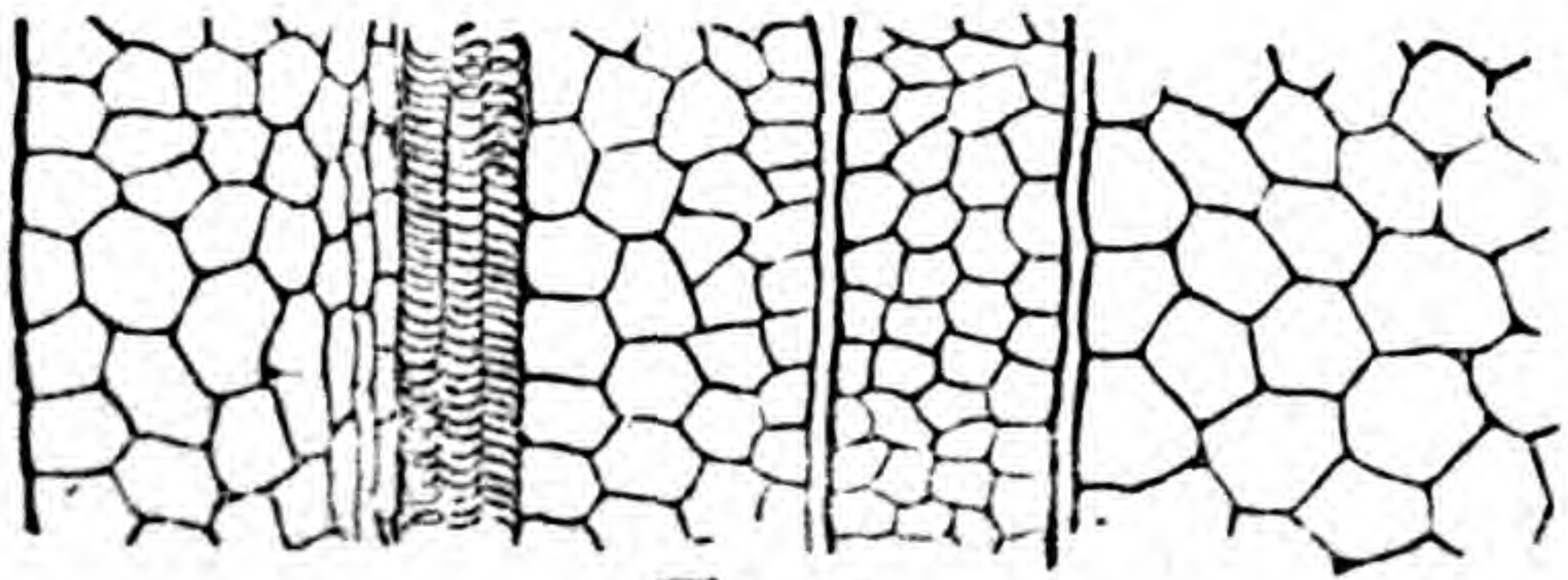
Fig. 10.

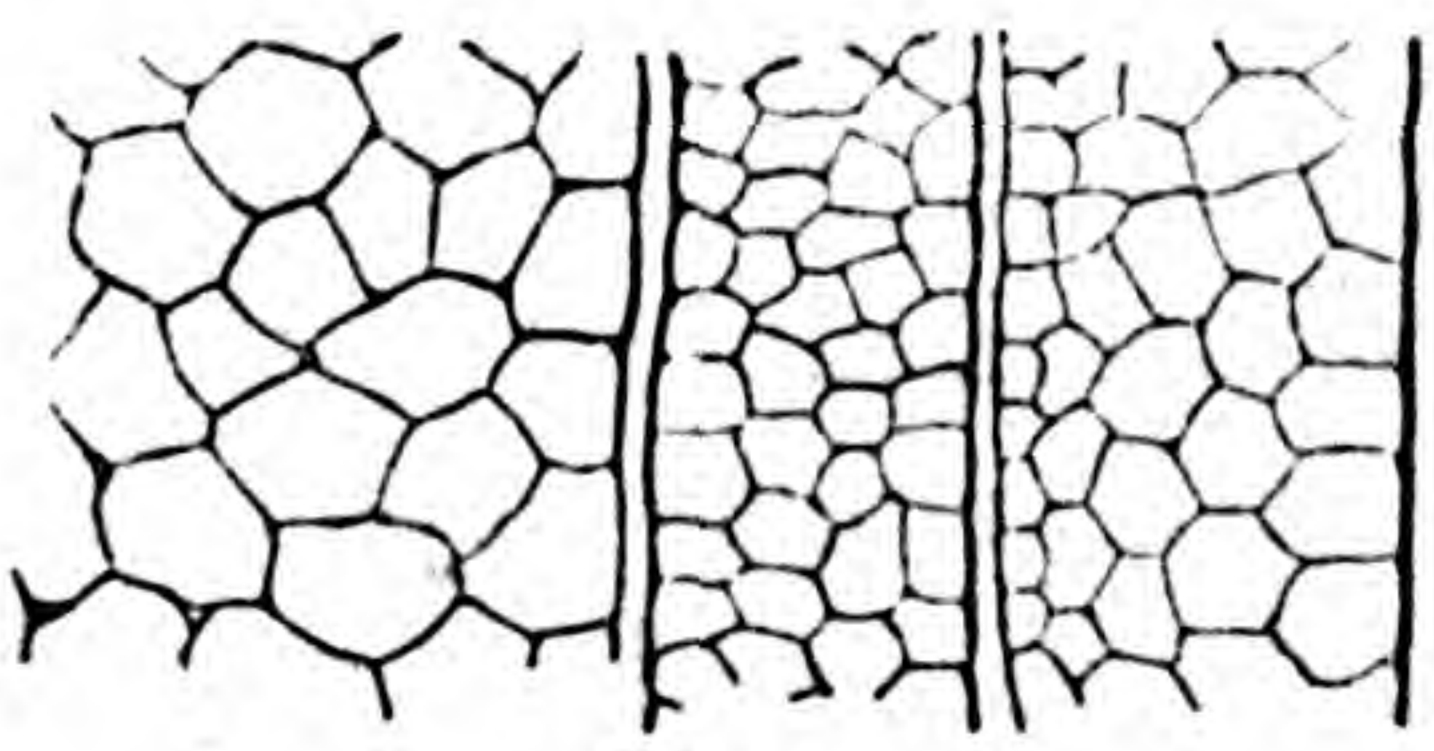
Fig. 11.

the nucleus of an unimpregnated ovule. The cells forming the inner lining of the primine at this time hardly differ from the rest except in their smaller size. Fig. 12 represents an impregnated ovule, or forming seed, of about a line and a half in length; its natural size is indicated by the perpendicular line at the right of the figure. The raphe, turned towards the eye, appears more prominent than in nature, except when the body is a little withered; it is then as conspicuous as is represented. Fig. 13 is a magnified vertical section of the same, answering to that of fig. 9: *a*, the primine, or outer seed-coat; *a'*, its inner lining assuming a different texture and appearance; *b*, the secundine or inner coat, already beginning to adhere slightly to the nucleus *c*. On the other side, *d* is the cord of vessels of the raphe. A slice of the tissue through *d*, and extending into the nucleus, sufficiently magnified to reveal the structure, is shown in fig. 14, the parts of which are correspondingly lettered. The cord of spiral vessels, with some forming pleurenchyma, is still found in about the middle of what becomes the fleshy coat of the seed, while a stratum of narrow horizontal cells (*a'*) are developing on its inner face.

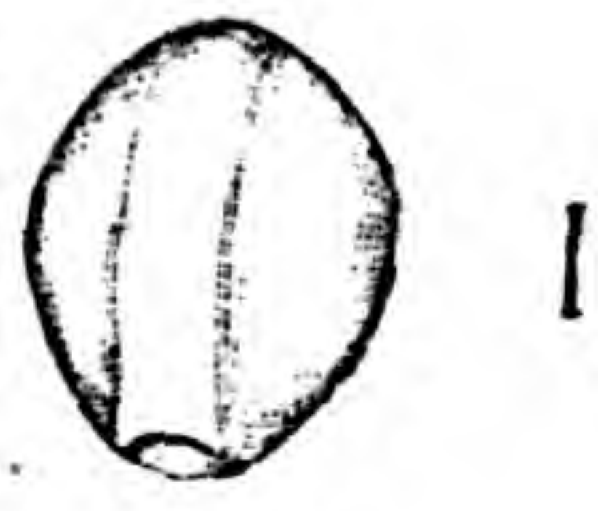

Fig. 12.

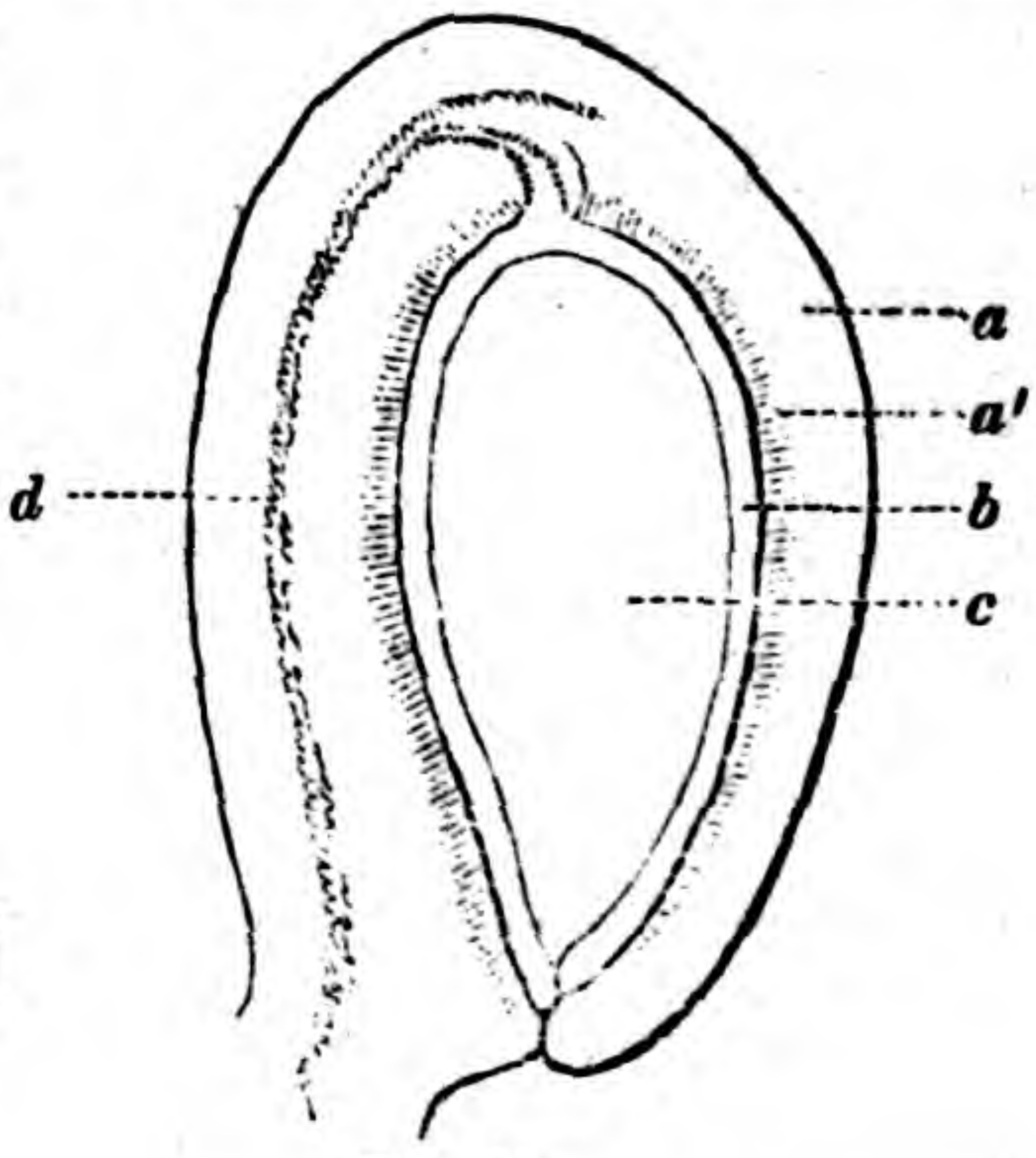

Fig. 13.

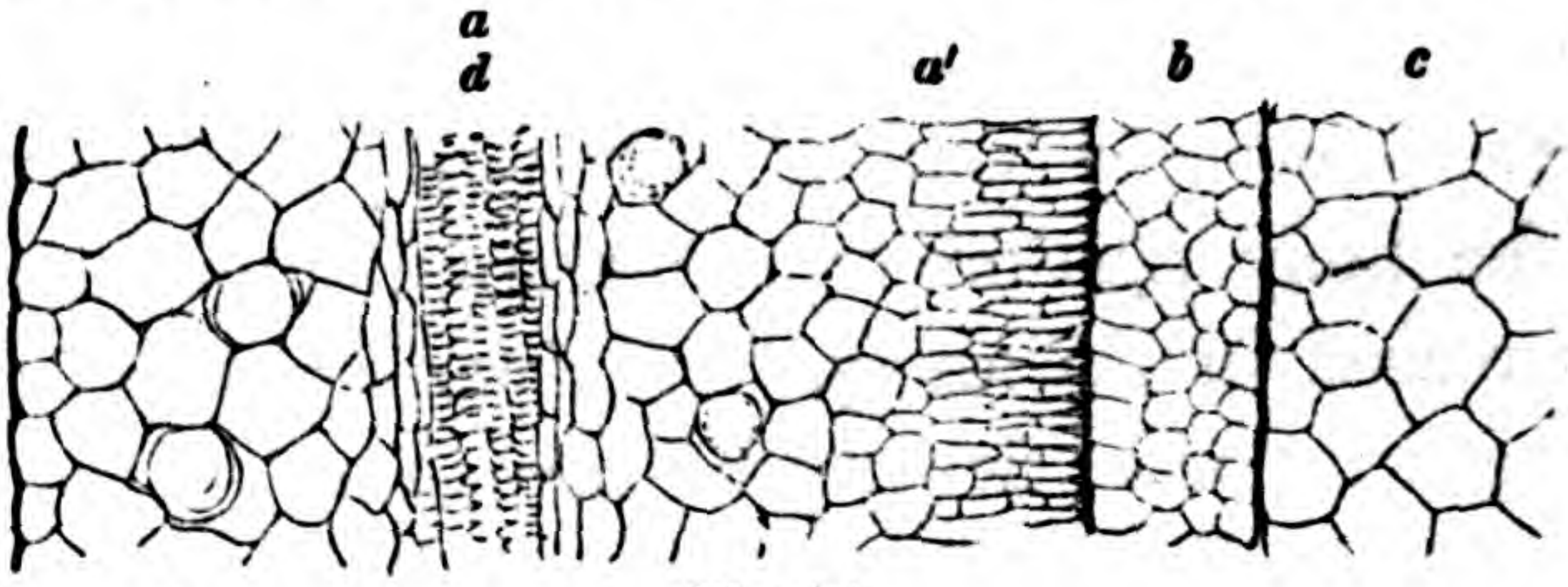

Fig. 14.

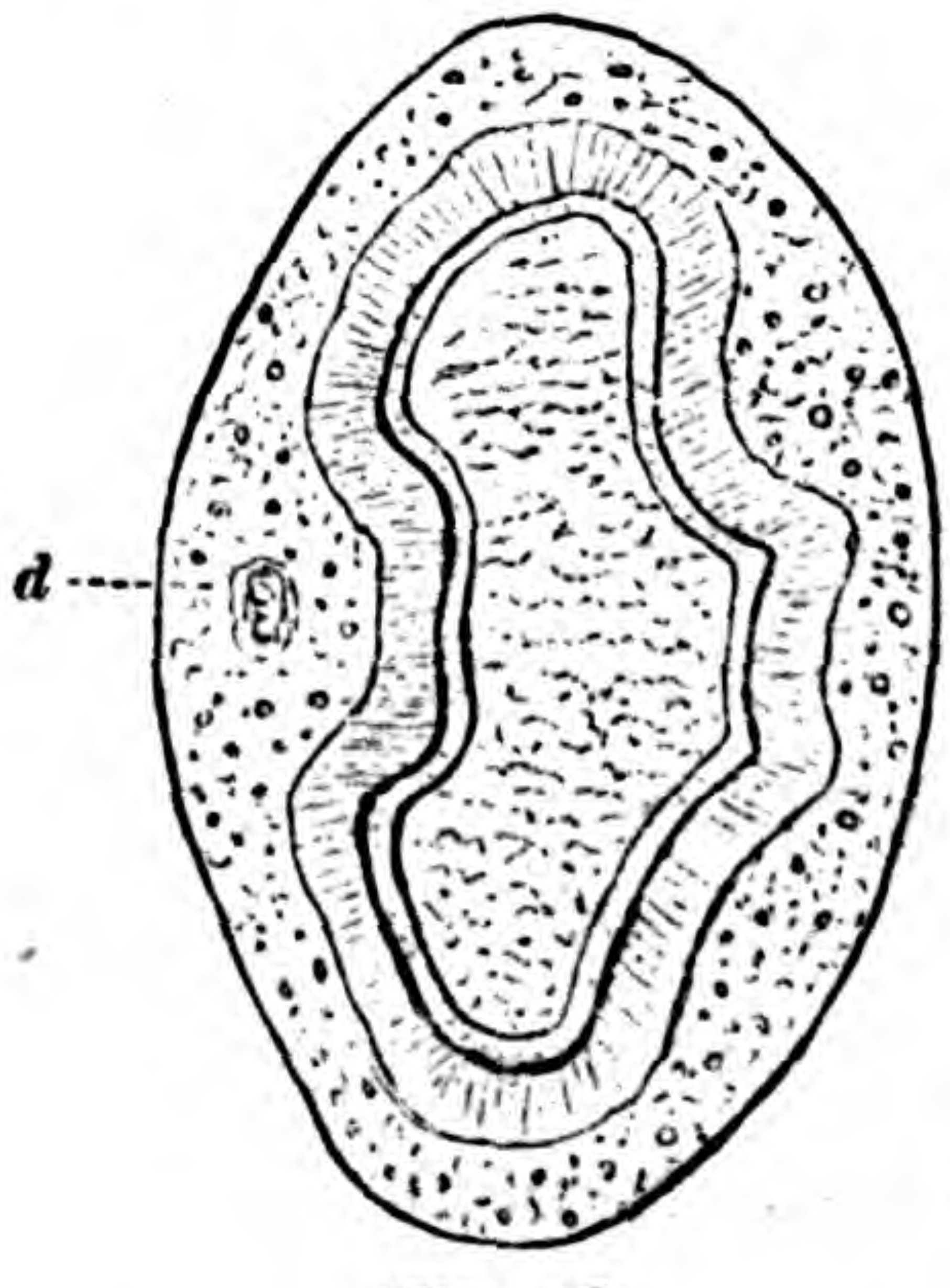

Fig. 16.

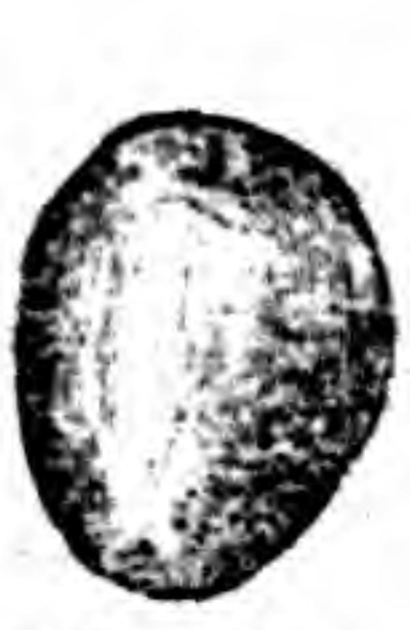

Fig. 15.

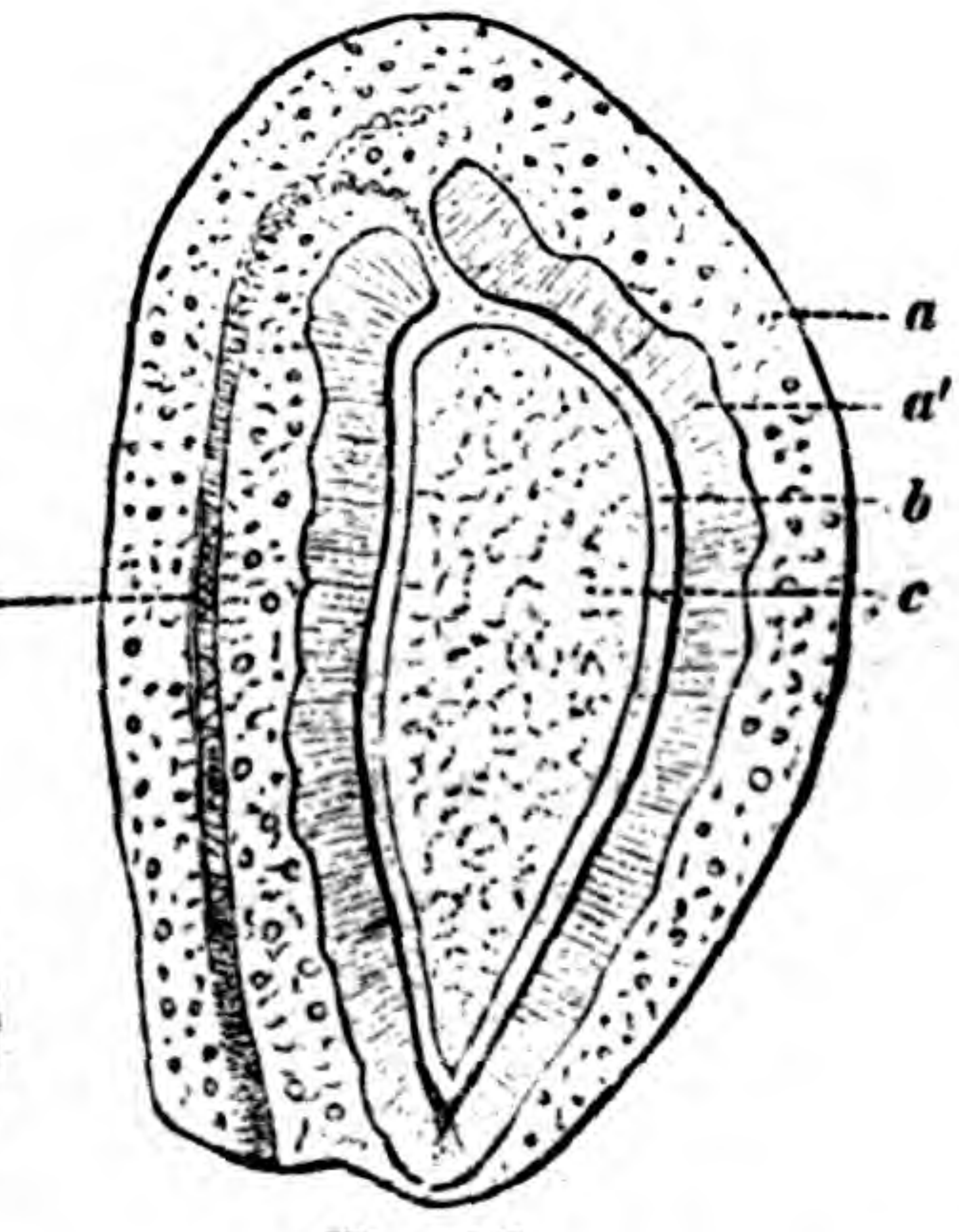

Fig. 17.

Our next stage exhibits the seed almost full-grown, and of the size represented in fig. 15. This is taken early in July, about three weeks before the cones begin to assume a rosy hue, and while the crustaceous coat of the seed, although well developed, is only of a firm fleshy texture, or just commencing to harden at the chalaza. The tissue of the fleshy coat is by this time well filled with scattered oil-receptacles. The raphe, visible externally when the seed is a little withered, when fresh is hardly more to be discerned than in a *Pæonia*. Fig. 16 is an enlarged cross-section of fig. 15; *d*, the cord of vessels of the raphe. Fig. 17, a longitudinal section; *a*, the fleshy outer coat; *a'*, the forming bony coat; *b*, the delicate inner coat, answering to the secundine of the ovule; *c*, the nucleus; *d*, the cord of vessels of the raphe. Fig. 18 is a section of the tissue of fig. 17, and answering to fig. 14; the parts correspondingly lettered. The only difference is that the about-to-be bony portion of the testa is more definite and has much increased in thickness. In ripening, this soon hardens, and at length its outer fleshy part turns red.

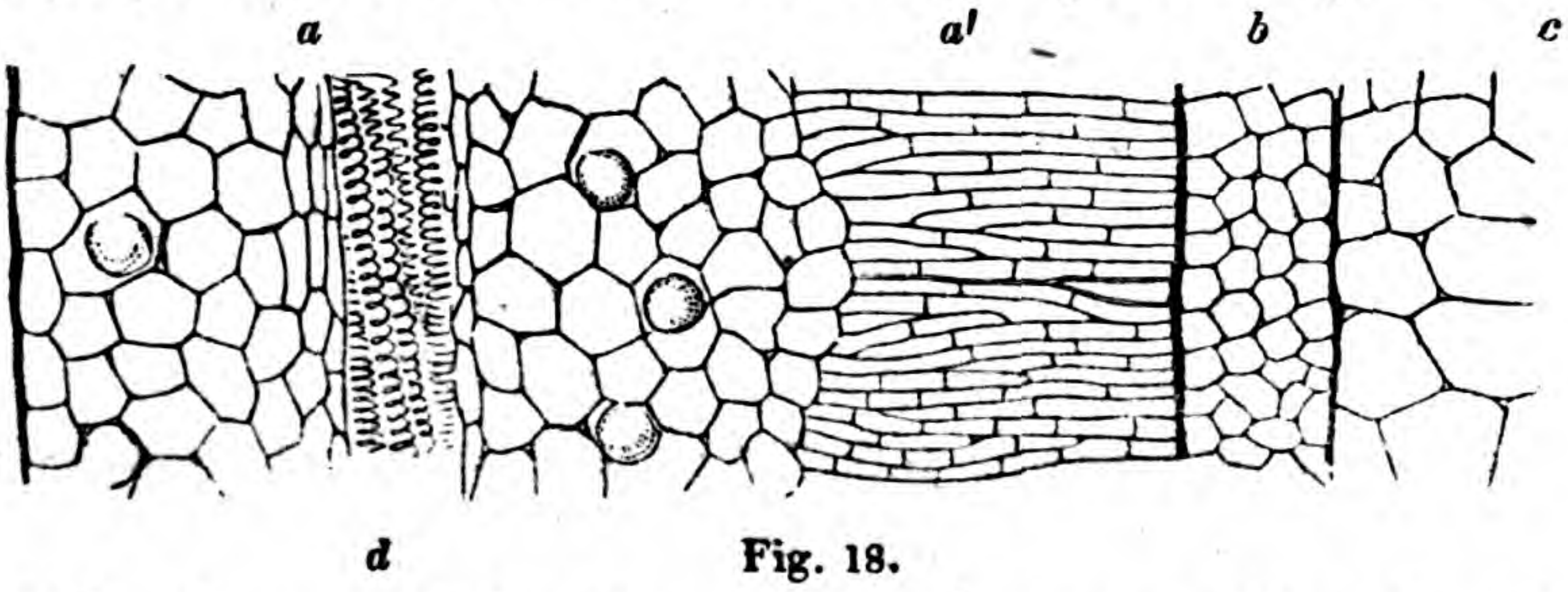

Fig. 18.

If these illustrations do not make the matter clear, the objector has only to examine the young seeds and ovules of *Magnolia* for himself. Although I do not perhaps completely understand how Mr. Miers arrived at the conclusions which he still maintains, I suspect it comes from his forming a wrong idea of the nature of the raphe, and from mistaking for the raphe in *Magnolia* the cord of vessels it contains. And I would ask him to make a comparative examination of the ovules and seeds of *Pæonia*; which, like many other anatropous seeds, at or before maturity, show no appearance of the raphe externally; in which the cord of vessels will be found more internal than in *Magnolia*, and yet where the fleshy surface of the seed will surely not be taken for an arillus, while the homologue of the latter is plainly visible at the base of the seed of most species. These seeds will also furnish convincing evidence that two, or even three, strata of very different texture may be developed from the primine or outer coat of the ovule.

Notes of a Botanical Ramble in the North of Spain. By JOSEPH WOOD, Esq., F.L.S. In a Letter addressed to R. KIPPIST, Esq., Libr.L.S.

[Read November 19th, 1857.]

MY dear Kippist,—I promised to give you some account of my botanizing in Spain, but I have done so little that I am afraid you will think it hardly deserving a reading at the Linnean Society. As we grow old, little obstacles, which we should at once have overruled in our youth, become serious hindrances; and some slight attacks of disease, my ignorance of the language, and still more, the impossibility in most cases of having a bedroom to myself, combined to limit my exertions.

We went by rail to Bayonne, and hastened our journey in order to proceed by a steam-packet which professes to pass weekly from Bayonne to Santander, and which was to leave the former place on Tuesday the 5th of May. On our arrival we found that it certainly would not start before Thursday. We therefore availed ourselves of a diligence just then on the point of setting off for Bilbao, where we were taught to expect another steamboat for Santander. We were again disappointed. The boat had been detained at Santander for some repairs. There is a diligence from Bilbao to that place, but as it is twenty-six hours on the road, while the steamer occupies only six, it seemed worth while to wait a little. We did not get away till Sunday the 10th of May, and arrived at Santander in the middle of a violent storm. Our return to Bayonne was hardly more fortunate, since a hole in the boiler obliged us to stop at Passages. We may hope that all these uncertainties will be remedied as the railway to Madrid advances, and the port of Santander becomes of more importance.

The country about Bilbao consists of woody or heathy hills in a somewhat loamy soil, belonging, it is said, to the lower chalk or upper greensand,—a formation which extends over a large portion of France and all along the north of Spain. We had a pleasant walk at Bilbao, but not very rich in botany. *Lithospermum prostratum* exhibits frequently on the banks its bright blue flowers; *Erica polytrichifolia* occurs here and there, and *E. vagans* almost everywhere. Its flowers had not yet made their appearance, whilst those of *E. polytrichifolia* were already dried up. *Dabœcia polifolia, Smilax aspera, Asphodelus albus, Quercus Ilex, Euphorbia procera,* and one or two plants of *Cistus salvifolius,* make up the list of those worth notice, but the weather was adverse to our researches.

The neighbourhood of Santander at first disappointed me, perhaps rather because there was not what I expected in the character of the vegetation, than from any absolute paucity of species. The hedges and general appearance of the country seemed very much like what we may see in England. A further examination, however, in a great degree corrected that impression. In the hedges we find *Laurus nobilis* and *Phillyrea media*, the latter very abundantly; and the banks are almost everywhere covered with *Scrophularia Scorodonia*, while *Smilax aspera* scrambles over the bushes. On the flowering branches the leaves have narrow divisions, while in those more distant from the flowers, the lobes assume the rounded form usually attributed to *S. mauritanica*. There are many rough bits of ground by road-sides, and some open spaces which might be called heaths. The largest of these seems doomed to perpetual barrenness from the custom of paring off the turf and carrying it away for fuel. In the others we meet with the *Dabœcia* and the *Lithospermum* already mentioned, and with *Erica vagans* and *Euphorbia verrucosa*. *Euphorbia procera* and *E. stricta* are also common about Santander: *Euphorbia platyphylla* is less plentiful. On these heaths are many spots of springy ground, adorned with several of our own more common bog plants,—*Hypericum Elodes*, *Anagallis tenella*, *Narthecium ossifragum*, &c., but no *Drosera*, and no *Pinguicula*. *Cyperus longus* is common. *Carex punctata* occurs in one or two places, and *Asphodelus albus* seems to prefer these moist situations. I found a *Carex* near my own residence at Fuente del Mar, which I at first put down as *C. genuensis*, but after a careful examination of different authors, I am inclined to consider *C. genuensis* as a nonentity, or at any rate a plant which it is impossible to identify. The one in question is probably a form of *C. glauca*, from which it differs in its larger size, the rounder and less pointed glumes of the fertile spikes, and by the rougher fruit. The spikes are erect, the fertile ones somewhat compound, the barren ones three or four in number, but these circumstances are occasionally found in *C. glauca*. Other plants not very common in England are, *Scilla verna*, *Vicia bithynica*, and *Lathyrus Nissolia*; and there are two or three plants not rare with us, which nevertheless may deserve notice. *Anthyllis vulneraria* is very common, but invariably with purple flowers. *Daucus Carota* abounds in all the meadows; it is white-rooted, and I think the same as our English species, though much larger and more luxuriant than when growing on the chalky downs about Lewes. *Linum angustifolium* is so abundant as to form in many pastures a considerable portion of the herbage. Two rarer plants, *Melilotus messanensis* and *M. parviflorus*, grow by the side of the embryo railway.

Almost everywhere about Santander we find a *Raphanus*, which I believe to be the *R. Landra* of the South of Europe. At the beginning of May the pods had uniformly one cell and one seed; as the season advanced the number of joints increased, and before I came away I found one or two pods with six joints. At that time the plant seemed to have attained its full development, and the more perfect pods (for there were still many of one or two joints) seemed originally to be furnished with five or six ovules, one or two of which were frequently abortive, leaving isthmuses in the pods. In all this it approaches to *R. maritimus*, and no satisfactory distinction has been pointed out between them.

These notes relate to my first arrival at Santander. A few days afterwards *Serapias cordigera* began to show its dark purple flowers in the meadows, frequently growing in company with *Orchis latifolia*. *Serapias Lingua* appears a little later. This is chiefly distinguished by the gland at the base of the label, which in *S. cordigera* is divided by a deep furrow through its whole length. In *S. Lingua* it is so divided only at its base, while the extremity is rounded and entire, or only marked by a slight dimple. Unfortunately these glands shrink almost to nothing in drying, and no distinct character can then be observed in them. Nevertheless the plants are still readily known by the smaller and fewer flowers of *S. Lingua*, by the smaller label and narrow form of its middle lobe. *S. oxyglottis* of Bertoloni is a mere synonym of *S. Lingua*, and its admission into the 'Tourist's Flora' was an error. *S. longipetala* is separated from *S. cordigera* not only by its narrower label, but by the flowers disposed in a lengthened spike, while in *S. cordigera* they are always approximated at the top of the scape. Amidst the great abundance of *S. cordigera* I was in hopes of finding the *S. triloba* of Viviani, but I looked in vain. A comparison of specimens satisfies me that the plant of Lloyd (Flore de la Loire inférieure) is the same as that of the Genoese botanist, and this, according to Godron, is a hybrid between *S. cordigera* and *Orchis laxiflora*. I did not see the latter species in Spain.

Towards the end of May *Oxalis corniculata* makes its appearance, and another *Oxalis*, which covers the ground under the

Indian corn and the larger vegetables. It is stemless, with an umbel of lilac flowers, and an anther-like double gland at the extremity of each sepal. The bulb is exceedingly compound, throwing off as the plant advances a great number of bulbels, and as it propagates itself also by seed, it is become a great pest in all the cultivated land. It is a recent addition to the Spanish flora, and is believed to have been introduced among some hay imported from South America for the use of the British legion.

Another plant of doubtful history which I must not omit to mention is a *Lathyrus* having much the appearance of the common sweet-pea, but with rather smaller flowers and a standard of deeper purple. The pod is however very different, quite smooth, much longer than that of *L. odoratus*, and with a greater number of contiguous, sessile seeds, which are somewhat mottled when ripe. It is, I believe, perennial, though where I saw it, it was growing abundantly in the midst of a bed of sweet-peas in Mr. Sewell's garden. It appears that Mr. Sewell's gardener had gathered seeds of *Lathyrus sylvestris*, which grows just outside the gate of the premises, and had mixed them with sweet-pea seeds, and he believes that the plant in question is a hybrid between *L. odoratus* and *L. sylvestris*. This seems very improbable; because the plant in question is earlier in flowering than either of its supposed parents, and because it forms a fuller pod than either of them, and with apparently perfect seeds.

Among the later plants which are found in the immediate neighbourhood of Santander, I will mention *Inula crithmoides*, *Lavatera cretica*, which takes the place of our *Malva sylvestris*, *Lepidium Draba*, *Linum gallicum*, *Linum strictum*, *Lobelia urens*, *Lotus hispidus*, *Lythrum Preslii*, *Malva parviflora*, *Polycarpon tetraphyllum*, *Scirpus Savii* (there is no *Scirpus setaceus*), *Scirpus nigricans*, *Scorzonera humilis*, *Silene nutans*, and *Viola lactea* of Smith. *Lythrum Preslii* was first noticed by Gussone, but is not admitted as a species in the 'Flora Italica' of Bertoloni, that writer considering it as a variety of *L. Græfferi*. It is however a much handsomer plant. The flowers are a great deal larger, while the teeth of the calyx are smaller and less unequal. Gussone describes the plant as suberect and the stem as winged, neither of which I found to be correct, though the stem has occasionally the appearance of a wing on one angle; a circumstance which occurs sometimes also in *L. Græfferi*. The leaves are somewhat cordate at the base, but *foliis oblongis, basi subcordatis* would be a more exact description than *foliis cordato*-oblongis. We find also a *Linaria*, which I am inclined to think the *L. Prestrandriæ* of DeCandolle, whether this be a good species or not; its flowers resemble those of *L. spuria* rather than of *L. Elatine*; but many of the leaves are hastate, or more often with large teeth at the base. I have found in England and elsewhere, a plant which, having nearly the flowers of *L. spuria*, had some of the leaves hastate, as in *L. Elatine*, and I have thought it might be a hybrid between them, but the teeth at the base struck me as something I had not observed before. I did not notice at Santander either *L. spuria* or *L. Elatine*: this plant seems to take the place of both. I have never seen the intermediate plant in Sussex, where both species are abundant, and often growing together.

There are two walks near Santander very beautiful in themselves and very interesting to the botanist. The first is to a rock called Peña di Castillo, or the Rock of Castillo. This is a rugged hill above 600 feet high, about a mile from the town, and itself nearly a mile long, but very narrow, so that you walk along the ridge with a rocky precipice on the one hand and a steep slope on the other. It rises abruptly from the general level, and is unconnected with anything else about it. It is, I believe, of mountain limestone, which is said in this part of Spain to abound in calamine: I am told that there are also two other limestone formations, one belonging to the lower chalk or greensand, and the other to the Jura limestone, but I cannot say that I learnt to distinguish them. This Peña di Castillo affords the most beautiful views over the bay of Santander and its surronnding mountains on the one side, while on the other the eye wanders over the nearer hills to the open Bay of Biscay. To the west, or rather I believe to the south-west, we distinguish three groups of mountains, which in May were entirely covered with snow. At the beginning of July, when I left Santander, two of these groups offered only detached spots and lines of snow. The third, the Sierras Albas, still exhibited it in great masses. All these masses are visible from Fuente del Mar, the house which was my very pleasant home. On this rock I first noticed *Genista hispanica*, *Erinus alpinus*, *Linaria origanifolia*, and *Teucrium pyrenaicum*, all of which I observed in various places afterwards. *Orchis parviflora* grows in tolerable plenty on the slope of the north side; but I was surprised to see on such a rock several moisture-loving plants, as *Valeriana dioica*, *Lathyrus palustris*, &c. There is also a small quantity of *Anemone Hepatica* and *Saxifraga Geum*. The ridge of the rock affords, however, the best harvest. Here were *Centranthus Calcitrapa* and *Conyza* *saxatilis* in abundance, *Osyris alba*, *Ruta bracteosa* (the three latter I found only in this place), *Euphorbia portlandica*, and *Stachys recta*. *Campanula Erinus* was abundant in one spot. There was also a large yellow *Orobanche*, which however I suspect to be only a variety of *O. major*. An abundant shrubby vegetation on a rocky soil prevented me from ascertaining on what plant it was growing. I noticed afterwards what appeared to be the same species on an old wall at Somahoz, but the labours of M. Reuter, in the 'Prodromus,' have rendered it impossible to determine the species of an *Orobanche*. It is very possible that a skilful botanist may distinguish species, where the differences are inappreciable by a less practised eye; but unless he can point out some characters which would enable a brother botanist to identify his plants, he renders the science only the more obscure by publishing them.

To return to La Peña: *Ficus carica* grows in the crevices of the rocks, and if not an original native, is now perfectly naturalized. Bushes of *Quercus Ilex* are found with prickly leaves: I mistook it at first for *Quercus coccifera*. At the foot of the Peña, in a meadow crossed by a track leading from some quarries down to the shore of the harbour, we find great abundance of *Serapias cordigera* mixed with the rarer *S. Lingua*, and I believe it was here that I gathered some specimens agreeing perfectly with *S. stricta* of Welwitsch, which is, I think, the *S. parviflora* of the 'Prodromus.' *Carum verticillatum* occurs on the same spot: and a little farther from the Peña, at the head of the bay, on a flat moorish tract not much elevated above the tide, I met with *Simethis bicolor* plentifully, *Pinguicula lusitanica*, *Cicendia filiformis* and *Illecebrum verticillatum*. One would prefer to find plants not known in England, but there is great pleasure in meeting with those we have formerly thought it a triumph to find in our own country.

Another interesting walk is towards the mouth of the harbour. There is a delightful footpath a little way from the edge of the low cliffs which form its shore, and though the mountains are the same as those we admired from Fuente del Mar and from La Peña di Castillo, they present themselves in new forms and with new combinations. One of the first objects in this direction is an *Iris*, growing in company with *I. fœtidissima*; it is perhaps *I. pumila*, but I saw no trace either of flowers or fruit. The two species of *Serapias* are abundant, and we have likewise *Ornithogalum narbonense* and *Allium fallax*. *Cynosurus echinatus* and

Briza maxima also invite our attention. Continuing my walk, I found in a cornfield *Cephalaria syriaca.* The almost sessile heads, and those on long stalks, on which DeCandolle founds two varieties, sometimes occur in the same plant; and he does not notice the very prolonged receptacle, which is a striking character. *Sedum Cepæa* also occurs in this walk, *Tolpis barbata, Picridium vulgare,* and *Adiantum Capillus Veneris,* which however I did not see.

The land forming the north side of the harbour of Santander terminates in a peninsula, and an island on which they are now building a lighthouse. The peninsula is composed of limestone rock, a large portion of which is covered by sand-hills. I expected to find here the plants which abound on the sand-hills at Biarritz, but the best are wanting. Those observed there which I have not already noticed were *Dianthus gallicus, Medicago striata, Herniaria glabra, Pulicaria odora, Linaria supina, Scrophularia canina, Veronica prostrata,* and *Sclerochloa Triticum.* Another set of sand-hills between this peninsula and the present lighthouse affords *Artemisia crithmifolia* and its parasite *Orobanche arenaria,* and *Allium sphærocephalum.* There is a large extent of sand-hills on the opposite side of the mouth of the harbour, which are heaped up to a considerable height above the limestone rock; they offer every step of the progress from loose blowing sand to a close covering of turf, but I found hardly anything which I had not previously noticed. There was one bush of *Cistus salvifolius.* I had expected to find Spain full of *Cistus*; but this plant, another at Las Caldas, and one or two others, all of the same species, at Bilbao, were all that I saw of the genus. *Juncus acutus* is very abundant on these sands, and I got *Arabis ciliata, Medicago marina, Ætheorhiza bulbosa, Cynoglossum pictum, Plantago montana,* and in a moist spot *Lastræa Thelypteris.*

I have still a few gleanings of the country near Santander. On the shores of the Bay of Biscay I found *Linaria græca.* On the road towards Burgos, which sets off westward instead of eastward from Santander to get round the head of the harbour, there is a range of hills on a base of limestone: I visited it twice. They present a remarkable feature, which also prevails among those towards the lighthouse: it is the frequent occurrence of conical depressions or craters, which one might fancy to be volcanic, did the nature of the soil permit such a supposition. They are of different sizes, mostly filled up with trees or brushwood, and often ranging in lines, which seem to occupy the position of a continuous valley. The woods on these hills abound in *Arbutus,* *Pulicaria odora* is pretty plentiful in one part; *Euphorbia dulcis* and *Thesium pratense* may be met with, and a *Daucus* just coming into flower, which perhaps may be different from *D. Carota.* I also observed an *Ophrys* with a short forward point like that of *O. arachnites*, but it was entire, rather favouring the idea that this is only a variety of *O. apifera*; but I did not see any plant of *O. aranifera*, and I am not disposed to believe it a hybrid.

On the 5th June I went up to a village called Las Corales, and on the 11th made a hasty trip to Reinosa. On the 21st I was again at Reinosa and went on to Pozazal. On the 25th I went to Alar, and on the 1st July returned to Santander. There is a railway now in progress from Santander to Alar, whence perhaps it may at some future period be continued to Valladolid and to Madrid. The part now completed occupies the summit level, at least as far as the road to Valladolid is concerned. It extends about thirty miles from Reinosa to Alar, and at Pozazal (pronounced Pothathal) the highest station attains an elevation of 3300 feet above the Bay of Biscay. Reinosa is forty-two miles from Santander, but it is expected that the railway for the greater part of this distance will be completed in the autumn of 1858. The remaining portion, which includes the most difficult part of the ascent, will require at least another year. The present journey to Reinosa is performed by diligences, passing through Torre la Vega, which will not be touched by the railway. Torre la Vega is situated in a beautiful valley well watered and well cultivated, with a mixture of trees, and surrounded by hills of varied forms, generally woody, sometimes rocky. It is seated in the valley of a little river called the Bisaya, the course of which we ascend through a narrow gorge to Las Caldas, a place, as its name implies, of hot springs. These rise just where the limestone rock makes its appearance, from under the beds of a hard sandstone. This limestone rises into mountains of considerable elevation, forming the northern boundary of the valley of Las Corales, in which the lower hills are mostly of a loamy soil, attributed to the greensand. Las Caldas would be a good botanical station for a few days, as these three soils would each contribute some peculiar plants, the best being probably in connexion with the limestone; but my stay there was very short: *Nasturtium pyrenaicum*, *Sedum dasyphyllum*, *Ligusticum pyrenæum*, *Eryngium Bourgati*, *Galium sylvaticum*, and *Valantia hispida* being my chief prizes, together with several species found in England on the chalk and on the mountain limestone.

I was three or four days at Las Corales—not, I think, a particularly good station for botany. Besides *Simethis*, *Teucrium pyrenaicum*, and some other plants before enumerated, I got *Lathræa clandestina*, *Anarrhinum bellidifolium*, *Lactuca tenerrima*, *Ononis mollis*, *Linum hirsutum*, *Orobus sylvaticus*, *Quercus pubescens*, *Sisymbrium austriacum*, var. *acutifolium*, and *Arenaria montana*, all of which would probably be found about Las Caldas.

Leaving Las Corales, we again ascend the course of the Bisaya through another gorge penetrating a very hard sandstone, which again opens into another valley, and from this a third and more magnificent gorge leads us to Reinosa. The proposed railroad is to pass through the two lower defiles; but the upper ascends too rapidly (1 in 17) for a railroad to follow it, and it will have to make a wide circuit. I observed a *Cacalia* and two or three other alpine or subalpine plants on some wet rocks in this upper gorge, probably brought down by the torrent, for we are far from having reached an elevation to account for their presence.

Reinosa is 3000 feet above the Bay of Biscay. The highest springs of the Bisaya are within two miles from it; but the town stands on the Ebro, whose nominal source is about five miles distant. I say nominal, because it appears to me that in this, and some other cases, a copious and permanent spring receives the honour of the name, while in fact the highest waters are several miles distant. The highest waters of the Ebro are, I apprehend, to be sought for in one of the snowy Sierras which we see from Santander, and probably in the highest of them, the Sierras Albas, though I am not sure that we see these from Reinosa. The most conspicuous of those we do see are the Sierras Sejos, which are real craggy mountains, retaining a good deal of snow at the beginning of July even on their southern faces. The hills immediately about Reinosa have rounded forms much like those of our Sussex chalk hills, but on a larger scale. Even these retained some patches of snow all through the month of June.

The general appearance of the vegetation at Reinosa is very different from that at Santander, and the climate is very different; very cold in the winter with immense quantities of snow, while the summer is hot from the unclouded sunshine. My first walk was to some low, but somewhat rocky, hills near the railway station. Here I gathered *Ophrys lutea*, *Scandix australis*, and a beautiful blue *Linum*, which, however, I found in much greater perfection in my walk the next day on the north side of Reinosa. It is, as well as I can make out, *Linum reflexum* of Hort. Kew.; though the reflexed lower leaves do not form a constant character.

The next day my walk was in the opposite direction, where I found, besides the *Linum* already mentioned, another species, which is probably a var. of *L. salsoloides*, though the open flowers are quite white, or with a faint tinge of yellow, while the buds are decidedly yellow. As the yellow-flowered *Linums* are usually considered to form a division of the genus, this rather puzzled me. These were on a small rocky knoll at the foot of the larger hills, and with them a variety of *Astragalus monspeliensis*, some of it with pink and some with yellowish flowers.

The meadows on the way to this knoll were filled with a handsome erect variety of *Campanula Rapunculus*, *Orobus albus*, and *Pedicularis comosa*. This *Orobus*, however, has the stipules fully as long as the common stalk; while in what I suppose to be *O. canescens*, which I met with afterwards, the common stalk is very short, hardly one-fourth of the length of the stipules. A little beyond these meadows, at the foot of the hills, grows *Vicia Onobrychoides*, a beautiful species. I may add to the plants of this place, *Alyssum campestre*, *Biscutella saxatilis*, *Erucastrum obtusangulum*, *Helianthemum polifolium* and *canum*, *Medicago suffruticosa*, and *Coronilla coronata*. *Carum bulbocastanum* is abundant in the corn.

On the 13th of June I went on the railroad as far as Pozazal, but an attack of illness prevented my researches and sent me immediately back to Reinosa, and afterwards to Santander, so that *Orchis pallens* and *Scorzonera humilis* were all I took back with me. On the 23rd I again went to Pozazal, and availed myself for a few days of the hospitality of Mr. Ross at the station. A rough hill gave me a *Scorzonera*, which I have not been able to determine. I saw afterwards a specimen of the same plant in the herbarium of M. Darracq at Bayonne under the name of *S. humifusa*, but that gentleman could not tell me where it was found or what was the authority for the name. It does not occur in Steudel nor in the 'Prodromus,' and is very badly applied to a plant with an upright, single-flowered scape. The description in the last-mentioned work of *S. crispa*, a plant of the Crimea, approaches more nearly to it than any other I have met with; but the neck of the root is not at all fibriferous, and among a great number of plants I saw no indication of a second flower. On this hill, which is on the side of the road opposite to the station, I also gathered *Dianthus pungens* and *Serratula humilis*. *Carduncellus mitissimus* is very abundant here and elsewhere. On the same side of the railroad as the station are some barren fields, cultivated, but apparently to little profit, divided by banks adorned with a few bushes—a sort of rudimentary hedge. Here I procured *Tragopogon crocifolius*, whose flowers, half yellow and half purple, were very conspicuous; *Achillea nobilis*, *Senecio Doronicum*, and *Thapsia villosa* just coming into flower; *Smyrnium perfoliatum*, *Arenaria grandiflora*, *Rapistrum rugosum*, *Hypericum hyssopifolium*, *Coronilla coronata*, *Vicia onobrychoides*, *Teucrium Polium*, *Stachys Heraclea*; another *Stachys*, whose name I have not determined, which resembles *S. recta* in habit, but is sufficiently distinguished by its numerous flowers (15 to 20 in a whorl), and by the floral leaves all exceeding the flowers; *Sideritis scordioides*, *Salvia Æthiopis*, *Cynoglossum cheirifolium*, *Aristolochia rotunda*, *Asphodelus ramosus*, *Allium roseum*, and *Echinaria capitata*. A variety of *Genista hispanica* with soft spines, *Prunus Mahaleb*, *Arenaria montana*, *Geranium sylvaticum*, *Trollius europæus*, *Ribes grossularia* with fruit hardly larger than a currant, *Crepis paludosa*, and *Pinguicula grandiflora*, grow on some hills a little farther to the south, where there is an ancient wood of oak and beech. Some of the trees are very large, but the best have been lately cut down for the use of the railroad.

There is a morning train from Reinosa at half-past six, reaching Pozazal at six minutes past seven, returning in the evening by that place at thirty-one minutes past eight, and arriving at Reinosa at nine. A botanist may therefore very conveniently fix his headquarters at Reinosa to visit the neighbourhood of Pozazal, or even of the two following stations, where I did not stop, and where, as seen from the railroad, there is no very promising locality. The station for Aguilar is about two miles from the town; but this, with its picturesque castle and varied neighbourhood, would seem to be well worth a visit, perhaps a lengthened one, especially if the botanist should be tempted to visit some very bold snowy and craggy mountains visible from the railroad in that direction. I must observe that these notes on Spanish botany apply only to the plants of the lower country. I did not attempt to scale any mountain; but the Sierras Albas, which are visible from about Santander, always retaining a considerable body of snow, and those still more abrupt ones behind Aguilar, cannot but offer a number of interesting plants. . Mountains said to be still more lofty occur farther west, in the Asturias.

About two miles from the station at Aguilar, on emerging from a very short tunnel, we find a village called Villa Escusa. Unfortunately the train does not stop there; but I was indebted to

Mr. Mould for the opportunity of visiting the hill above it called Congusto, a very curious eminence from the labyrinth of detached and fantastic limestone rocks which crown its summit, and particularly interesting to the botanist from the number of good plants which grow upon it:—

Alyssum montanum.
Sisymbrium —— ?
Arenaria tetraquetra.
Arenaria conimbrensis.
Linum salsoloides.
Linum salsoloides, yellow-flowered.
Linum reflexum ?
Rhamnus alpinus.
An *Umbellate*: undetermined.
Saxifraga —— ?
Hieracium —— ?
Serratula nudicaulis.
Centaurea —— ?
Thymus vulgaris.
Stachys —— ?
Coris monspeliensis.
Rumex bucephalophorus.
Euphorbia serrata.
Ophrys lutea.
Ophrys tenthredinifera.
Anthericum Liliago.
Trifolium, perhaps *cæspitosum*, but more woody than usual.

The *Sisymbrium* here mentioned is in many respects like *S. austriacum*, but it is a much smaller plant, 4 feet high instead of 2 feet, and the pod is longer in proportion and much more slender. The *Linums* are those I have already mentioned. The *Umbellate* was not far enough advanced to show the nature of the seeds. The root-leaves were simply pinnate, oblong in the outline; the leaflets sessile and almost as broad as long, incise, and the lower ones almost palmatinerved. The stalk spreads out into a broad sheath with a membranous margin. The stem-leaf pinnate, with few, linear-lanceolate leafits. Bracts one or two. Bracteoles about 5. Calyx obsolete. Flowers pinkish, not at all radiant.—The *Saxifrage* belongs to the division *Dactyloides* of Tausch, and to my division C. ii. *a*. M. Darracq pronounced it to be the *S. ladanifera* of Duby, *pedatifida*, Auct.; but that has the leaf deeply divided into three parts, and these again more or less subdivided: the plant of Congusto has thick fleshy leaves, not viscid when fresh, but exuding a gummy matter along the margin in drying. They end in 3 or 5 teeth without any deep separation; the barren shoots are not much lengthened, and the whole plant is rigid to the touch. The haft is not longer than the blade. Teeth of calyx very blunt. Quære if *S. capitata* ?

My next plant is a *Hieracium*, and I am almost tempted here to repeat the remark I made on *Orobanche*. This plant seems to belong to the *Villosæ*, or perhaps to the *Andryaloides*, for the hairs of the leaves and stem are feathery. As far as I have seen, it is one-flowered, very villous, with one or two very small leaves on the stem. Root-leaves broadly oval, attenuated sometimes rather abruptly into the haft, quite entire. I cannot find a place for it even in the multitudinous species of Grenier.

The *Centaurea* is stemless; the flowers yellow, two or three together on the crown of the root. Leaves pinnatifid. It resembles in habit *C. mixta*, a plant of Greece and of Asia Minor, but the outer and middle phyllaries terminate in a simple, somewhat dorsal spine without any accessory spines, and the appendage of the inner is narrow, terminating in 3 or 5 small prongs, instead of the broad papery membrane of *C. mixta.*

The *Stachys* is the same as that noticed at Pozazal.

Another hasty excursion took me from Pozazal to Alar. Before reaching the latter place we leave the limestone and all the supposed appendages of the greensand, and enter a country of gravelly hills. At first the boulders are large and often cemented into rock. As we advance, they are smaller, and with less solidity, and beyond Alar the hills gradually sink down into a sandy plain, which extends all the way to Palencia, and I believe to Valladolid. In the first part, however, these hills are varied and picturesque, though deficient in wood. They might be visited either on foot or on horseback from Villa Escusa or from Alar, where there is, for Spain, a very good inn. At Alar I gathered *Silene conica* and *S. conoidea.* The habit of these is sufficiently distinct to attract attention, and the much greater size of the seeds in *S. conoidea* affords a decisive character. *Helianthemum canum*, *Helianthemum hirtum*, *Helianthemum Tuberaria*, *Dorycnium fruticosum*, *Orobus canescens*, *Scorzonera hirsuta*, *Evax pygmæa*, *Micropus erectus*, *Convolvulus lineatus*, and *Thymus striatus*, Benth., *T. zygis* I believe of most authors.

The botany of the Pyrenees is too well known for me to think of adding to it, unable as I now am to scramble over mountains, and especially as each time I went up into their valleys I became ill. I may, however, make a few remarks for the use of those who, like myself, are not equal to prolonged exertion. At Pau, a few mountain plants are brought down by the Gave, and find a home on its wide bed of gravel. The valley at Eaux chaudes offers several interesting plants. There is a good carriage-road to Gabas, about six miles above Eaux chaudes. There you are at the foot of the Pic d'Ossau, and a mule-road passes thence into Spain, which, rising as all these Pyrenean passes do to a considerable elevation, must offer some alpine plants to the botanist. Near Bagnères de Bigorre rises the Pic de l'Hieris, a mountain covered with pine-forests, and celebrated for its botany; which however, though mountainous, is not alpine A few miles from Bagnères de Luchon is the Val d'Esquierri, also famous for its botany. After passing the little village of Oo, you ascend a shivery bank on the right, the upper part of which is craggy and woody; but the rocks are not firm, and on horseback the ascent is rather a nervous affair. Above this you enter a grassy valley with a rich variety of plants, rather however subalpine than alpine; but the slopes which bound it on each side ascend to patches of snow. I met two botanists as I descended, who were prepared to pass a night on the mountain—the only way of examining thoroughly its productions. The Port de Venasque is also visited from Bagnères de Luchon; but I apprehend the best station for examining this neighbourhood would be the Spanish town of Venasque, where there is, I am told, a very tolerable inn, much better than the Hospice on the French side, and where you are immediately at the foot of the mighty Maladetta.

We returned by Cette and Arles, taking advantage of the railway from Toulouse. At both these places there is a good warm-country botany, and of a very different character in each place; Cette presenting limestone rock and the sands of the sea-shore, while about Arles all is gravel. The uncultivated lands about Nismes will also gratify the botanist with several interesting plants delighting in a limestone soil; and various points above Arles and about Orange, and some other places among the gravelly hills which there bound the immediate valley of the Rhone, will afford him abundant opportunity of examining the productions of that soil. The railroads now make all these places easily accessible.

If any botanist should be disposed to follow me in a visit to the N. of Spain, the foregoing observations may perhaps help him to direct his steps. The Pyrenees are so well explored, that there is no hope of making new discoveries among them, unless indeed they be founded on those nice and almost intangible distinctions which seem now to be in favour with many of the French botanists. With the range of high land which forms a continuation of the Pyrenees along the north coast of Spain, the case is far different. Their productions are comparatively little known; and though neither so high nor so abrupt as that part of the chain which separates France from Spain, yet, as in the Asturias the mountains rise to the height of 10,000 feet, and in many other places to seven or eight thousand, they must offer great varieties of soil and situation. An accomplished Italian botanist is said to be about to publish a flora of the whole range, from Rosas on the Mediterranean to Cape Finisterra; but one man cannot exhaust so extensive a subject, and the book when published would be a useful guide for future explorers. If an English botanist should then be disposed to visit the North of Spain in 1859, he will probably find the steamers either from Liverpool or from Southampton on a better footing than they are at present, and there would doubtless be some improvement in those from Bayonne. At Santander such a traveller would stay two or perhaps three days, visiting the Peña di Castillo, the sands at the mouth of the harbour, those towards the lighthouse, and the shore of the Bay of Biscay for two or three miles west of the lighthouse. The railway would then take him to Las Caldas: I doubt if he would find it worth while to stop before reaching that place, as he is likely to find little which would not be obtained either at Santander or at Las Caldas. At Las Caldas he would have employment for three days at least on the sandstone of the gorge, on the limestone to the east, and on the loamy wooded hills to the west of the station. An interesting walk from Las Caldas would be across the plain of Las Corales to Somhoz, where crossing the river and turning to the left he will have another pleasant walk over some eminences partially covered with wood. Thence he may descend into a rocky valley nearly parallel to the Bisaya, and again keeping to the left return by the right side of the river, and explore the singular bank which divides the basin of Las Corales into two parts, one 20 or 30 feet higher than the other. A third and most magnificent gorge leads to Reinosa, and this gorge would be worth a day's examination. Above this, I believe I can add nothing to what I have already said as to localities. Reinosa might be the head-quarters for visiting three mountain masses: the Sierras Albas, the Sierra Sejo, and a third range to the east of the road, whose name I forget, but which, though perhaps not so high as the others, is yet sufficiently elevated to preserve some snow in its hollows throughout the year.

Note on the Genus *Hemigymnia*, Griffith. By THOMAS THOMSON, Esq., M.D., F.R.S., F.L.S., Superintendent of the Calcutta Botanic Garden.

[Read February 18, 1858.]

BOTANISTS will be glad to learn that a valuable contribution to our knowledge of the little-known flora of Malwah in Central India has recently been made by the labours of Lieut. Beddome, of the 42nd Regiment M. N. I., who has resided more than a year in the province, and has communicated to me many interesting specimens, as well as a catalogue of the plants of the vicinity of Jubbulpore, for publication in the 'Journal of the Asiatic Society of Bengal.'

In a notice of some plants of this little-known province, collected by Mr. M'Leod, Griffith* published a new genus of *Verbenaceæ*, under the name of *Hemigymnia*, which he considered nearly allied to *Tectona*, but readily distinguishable by the included stamina, the styles twice bifid, as in *Cordia*, and the fruit supported by the persistent calyx, which does not enclose the fruit as in *Tectona*.

As the original specimens of the plant on which the genus *Hemigymnia* was founded have not been seen by any botanist but Griffith, the brief description contained in that author's paper, and repeated in DeCandolle's 'Prodromus,' vol. xi. p. 697, is all that is known on the subject. These specimens, which were perhaps very imperfect, are probably still in the India House, where Griffith's original collection is believed to exist.

Among other interesting plants, Lieut. Beddome has sent excellent specimens of a tree which he considers to be Griffith's *Hemigymnia*. In this I have no doubt he is correct, for, except in one point, it agrees very closely with the description; and its native name *Deyngan*, though not identical with that assigned by Mr. M'Leod to *Hemigymnia* (*Dahman* or *Dahyan*), is so similar, that in all probability both are intended to represent the same sound.

Griffith's description having been transferred by Schauer with only some verbal alterations to DeCandolle's 'Prodromus,' it is not necessary to repeat it here. Lieut. Beddome's plant has an infundibuliform, striated, five-toothed calyx. The tube of the corolla is cylindric rather than infundibuliform; but the limb has five narrow oblong segments, nearly twice as long as the tube. There are five stamens alternate with the lobes of the corolla, and a four-celled ovary with one solitary ascending ovule in each cell. The style is twice bifid; and the fruit, still immature, is rostrato-cuspidate and "calyce cupuliformi semicinctus."

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* M'Clelland's Journal, iii. 361.

Lieut. Beddome's plant, however, differs from Griffith's description in its alternate (not opposite) leaves, and is an undoubted species of the genus *Cordia*, as now generally understood. Still, the agreement of every other character is so complete, that I cannot but think that Griffith has been misled by imperfect specimens to regard the subopposite arrangement of the leaves, so commonly seen close to the cymose inflorescence of many species of *Cordia*, as a constant character; and I feel equally certain that the supposed opposition of the leaves, and a certain general resemblance in foliage to *Gmelina*, and in flowers to *Tectona*, further led him to consider this plant Verbenaceous, notwithstanding the striking character of the division of the styles, to which he nevertheless directs attention as indicating an affinity with *Cordia*.

Turning to the described species of *Cordia*, I find a plant described by Wallich (Roxb. Fl. Ind. ed. Carey & Wall. ii. 329; Wall. Cat. 897; *C. Wallichii*, Don, Syst.; D.C. Prod. ix. 479) under the name of *C. tomentosa*, with which Mr. Beddome's plant should be compared, not only on account of a general agreement in the brief character assigned to it, but because it was described by Wallich from Heyne's collection, and may therefore not improbably have been obtained from the province of Malwah. As no specimens of Wallich's *C. tomentosa* exist in India, I have sent a small specimen of Mr. Beddome's plant to Dr. Hooker, with a request that he should compare it with the Wallichian herbarium and append the result to this note.

Should my conjecture prove unfounded, there are two other species of *Cordia* with which I think our *Cordia* will prove allied, and with which it should be compared, before it can be considered as new. These are, *C. ovalis*, R. Br., ? D.C. Prod. ix. 479, and *C. amplifolia*, Alph. D.C. Prod. ix. 481. This last is said to produce a valuable timber, agreeing in this point with the Jubbulpore plant.

There can be little doubt but that all these plants are closely allied; and the African origin of the last two affords an additional proof of the curious resemblance of the flora of Western India to that of Eastern Africa, as has already been pointed out in the 'Flora Indica' (Intr. p. 113), and which is strengthened by every addition to our knowledge of the botany of the province of Malwah especially.

Note by Dr. J. D. Hooker.

Lieutenant Beddome's plant (Griffith's *Hemigymnia*) is undoubtedly a species of *Cordia*, as Dr. Thomson conjectures, and allied to the *C. abyssinica*, Br. (*Varronia abyssinica*, D.C.), differing, however, from that plant in the pubescent upper surface and dense white woolly tomentum of the under surface of the leaves, which extends over the petioles, ramuli, peduncles, and calyces; its corolla is also much smaller. On the other hand, *C. amplifolia*, A. D.C., and *C. Wallichii*, Don, are both closely allied to *C. myxa*, and have terete, not grooved calyces. Of *C. ovalis*, R. Br., too little is known to speak decidedly. I have found imperfect specimens of the same species in Dr. Stocks' collections, but without any habitat; and others, also without a habitat, have been received from Dr. Gibson, in both cases probably from Central India. I may add, that I find in Dr. Thomson's Kumaon collections fruiting specimens of another anomalous Cordiaceous plant, *Gynaion vestitum*, A. D.C. (in D.C. Prodr. ix. 468), gathered at the same spot as those by Edgeworth, and originally described by A. D.C. It is, as A. DeCandolle himself suspects, a *Cordia* allied to *C. Griffithii* and *C. abyssinica.* I append diagnoses of both.

CORDIA M'LEODII (*Hf. & T.*). Arborea, ramis robustis, ramulis foliis subtus inflorescentiaque dense fulvo-tomentosis, foliis late ovatis ovato-cordatisve obtusis margine subsinuato undulatis coriaceis supra pubescentibus, floribus corymbosis, calyce tubuloso sulcato 5-fido, corollæ lobis parvis angustis.

Hemigymnia M'Leodii, Griff. in Calc. Journ. Nat. Hist. 1843, iii. 363; Schauer in D.C. Prodr. xi. 697.

Hab. In India centrali; Malwah! *Griffith, Beddome.* Concan? *Gibson, Stocks.*

CORDIA VESTITA (*Hf. & T.*). Ramis robustis, ramulis foliis novellis et inflorescentia dense sericeo-lanatis, foliis late ovatis elliptico-ovatisve acuminatis coriaceis supra scaberulis subtus pubescenti-tomentosis subsinuatis villosiusculisve, floribus polygamis cymoso-paniculatis, calyce sulcato 4–6-lobo lobis patentibus.

Gynaion vestitum, A. D.C. Prodr. ix. 468.

Hab. In Himalaya occidentali tropica; Garwhal ad Pau, alt. 3000–4000 ped.! *Edgeworth*; *T. Thomson.*

Note on some Suprasoriferous Ferns.

By THOMAS MOORE, Esq., F.L.S.

[Read May 5th, 1857.]

THE normal condition of the majority of the Ferns, as is well known, is to produce what is called their fructification, on the under surface or the back of their fronds, and hence they are called dorsiferous. There are, however, some remarkable deviations from this rule among the Ferns which belong to the dorsiferous class.

Some time since, in the "*Nature-Printed Ferns of Great Britain and Ireland*," I had occasion to mention the fact, that certain varieties of the common Hart's-tongue Fern (*Scolopendrium vulgare*), habitually produce sori on the upper as well as the under surface of their fronds. This occurs, for the most part, on those varieties, several in number, in which the margin is crenately lobed. In these cases, it often appears as if the normally-placed sori had been continued so as to reach the margin at the acute sinuses of the lobes, and then returned on the opposite surface; but it also frequently happens that the abnormally-placed sori are distinctly within the margin, and borne where there are no corresponding sori beneath.

Subsequently another example of this kind has been recorded by Sir W. Hooker*;—an aspidioid suprasoriferous *Polypodium* found in Ceylon. I have now to mention a still more remarkable instance, occurring in a totally different group of ferns, in which the fructification is normally marginal.

Some time ago I was favoured by my friend Mr. C. Moore, the Director of the Botanic Garden at Sydney, with some fronds, cultivated in the Sydney garden, of one of the Ferns he had obtained from New Caledonia. This fern, named after him *Deparia Moorii* by Sir W. Hooker†, I have already, under the name of *Cionidium*‡, brought under the notice of the Society as forming a Deparioid genus, with reticulated veins. *Deparia* normally bears its spore-cases within little cup-like involucres, standing out from the extreme margin of the fronds on little footstalks, and the same kind of structure occurs in *Cionidium*. In the specimens of *Cionidium Moorii*, above referred to, these normally-placed marginal exserted sori were abundant; but in addition to them were other perfect sori scattered here and there, both on the upper and under surface, entirely removed from the margin, sometimes even almost close to the midrib, and considerably more numerous on the upper than on the under surface. These surface-sori, in all the instances examined, proved to be furnished with the usual involucre beneath the spore-cases, but were apparently without any pedicel (the latter being, however, very short in the marginal sori of this plant), so that they were similar in character to those of *Woodsia* and *Hypoderris*, or as to position to those of the true (net-veined) *Aspidiums*, being placed directly on the network of veins.

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* Kew Journal of Botany, viii. 360, t. 11.

† *Ibid.* iv. 55, t. 3.

‡ Proceedings of the Linnean Society, ii. 212.

The inferences which may, I think, be drawn from these instances of anomalous structure, are, (1) that the veins are important structures in the economy of fern development, since they thus appear capable of originating the receptacle and spore-cases from their surface in any part—even in unusual parts—of the frond; and (2) that sufficient importance seems thus to attach to them, to justify their employment for the purpose of assisting in the definition of genera, in a family of plants where something more than the so-called fructification itself is confessedly needed to supply distinctive characters.

Description of a remarkable spike or bunch of Fruits of the Fig Banana (*Musa sapientum*), *var.* By Sir ROBERT H. SCHOMBURGK. Communicated by GEORGE BENTHAM, Esq., F.L.S.

[Read June 2nd, 1857.]

A VARIETY of the Banana is called here (that is to say in the Island of Saint Domingo) Guineo, and known in some of the English West India Islands as the Fig Banana. There is no outward mark of difference between a common Banana tree and that of the Guineo: the fruit of the latter is, however, much smaller, rounder, somewhat pointed on the opposite end, not unlike a fig, and of a much sweeter and far more delicious taste than the large Banana, resembling not only in odour, but likewise in taste, our apples, from which circumstance it has been called Guineo-Manzana or Apple Guineo, to distinguish it from the Martinica-Manzana or Martinique Apple Banana. The latter are the fruits of the so-called Chinese Dwarf Plantain (*Musa chinensis* of *Sweet*, which Paxton has re-christened *Musa Cavendishii*). This species was introduced into Santo Domingo from Martinique. The stem seldom reaches a height beyond 8 feet, and the racemes or branches of fruits are of such a size, that they touch the ground, containing from three to four hundred fruits, resembling a plantain in miniature by their being not so round, and somewhat angular, like the common plantain.

A few days ago, His Excellency Señor Buenaventura Baez, the President of the Dominican Republic, aware of the interest which I take in all that refers to Natural History, sent me a bunch of the kind of Bananas called Guineos, which differed in a very remarkable manner from any I had ever seen before; nor have I as yet found any person in Saint Domingo who had previously seen anything similar.

In the usual mode of inflorescence of the Plantain and Banana, the fertile flowers are produced in successive rows, and these having ceased, are succeeded to the end of the stem by barren flowers, none of which produce a fruit. Some botanists have therefore considered the genus Musa as unisexual by abortion.

The accompanying drawing of the bunch of Bananas which I received from his Excellency the President, shows a most remarkable deviation from the general rule. The upper part of the raceme, nearest to the stem, consists of eight rows of the Fig-Banana, numbering 125 full-grown fruits of that kind. After the eighth row, follow seven series of barren flowers, when, contrary to the usual mode, a new series of fertile flowers springs up, consisting of thirteen rows, which have produced 420 fruits, smaller in size than those of the upper part of the raceme, and resembling the Martinica Manzana, or fruits of the *Musa chinensis*, only that they are much smaller than the fruits of that description in their natural state.

We have here the singular circumstance of the production of two kinds of fruits, of the same genus it is true, but hitherto considered specifically different, on the same spike, although the plants of both are individually different in growth, and the fruits different with regard to appearance and maturity. The upper parcel of Fig-Bananas were all in full maturity, and commenced to fall off from the stem (as is the case when the Banana has reached its full ripeness), on the 11th of October, while the lower parcel of fruits began only six days later to assume a yellow colour.

The appearance of two different kinds of fruits on one and the same stem, reminded me of a somewhat analogous case in a family not many links removed from the *Musaceæ*, namely, the production, on the same spike, of flowers of *Monacanthus*, *Myanthus*, and *Catasetum*, formerly supposed to be different genera belonging to the family of the *Orchidaceæ*; my account of which is published in the "Linnean Transactions," vol. xvii. p. 551.

I have to regret that I did not see the raceme of the Banana, now under consideration, when it was in flower, or at any early state of its growth; for, although it was produced in a garden within the city, I knew nothing of it, until it was sent to me by President Baez; but as the flowers of Plantains and Bananas, including all the different varieties of the latter, are so much alike, even a botanist might have passed the tree without his attention being attracted; and this remarkable play of nature would only become observable when the lower series of flowers commenced to form themselves into fruits.

It affords, however, an additional instance in favour of the opinion which I have already expressed (when giving an account in the "Linnean Transactions" of the production of flowers on the same spikes of three different presumed genera of the order *Orchidaceæ*), that with regard to genera and species, we must prepare ourselves for remarkable discoveries.

Plants under cultivation are much more subjected to such freaks of nature, than when growing in their own soil and climate, left to themselves. I know, from my own experience in Saint Domingo, how little reliance can be placed upon the colours of fancy flowers, such as roses, dahlias, pinks, asters, &c.: even in cases where the mother-plant from which came the cuttings (in the case of roses or pinks), the roots (in the case of dahlias), or seeds (in the case of asters, &c.), were double, single flowers have succeeded. For example, cuttings from roses of the China-stock will, notwithstanding their having produced one year flowers of the variety of which they bear the name, revert perhaps the next year or later to the Chinese rose of old standing; and with regard to dahlias, they have produced single and double flowers of different colours on the same plant in my little garden. The latter happened in a very remarkable degree in a dahlia called "the Butterfly," which the second year produced double and single flowers on the same plant; here white, the leaves edged with maroon; there of a uniform deep maroon colour.

On Four Varieties of British Plants.

By JOHN HOGG, Esq., M.A., F.R.S., F.L.S., &c.

[Read Nov. 19th, 1857.]

I BEG to present to the Linnean Society four or five varieties of British plants, which were collected by myself during the last summer.

The first is a white-flowered variety of the common scarlet Corn Poppy (*Papaver rhœas*, var. *flore albo*). I gathered a single plant in a potato-field, at some distance from the village of Norton, in the county of Durham, on September 18th. The petals, when fresh, were of a beautifully delicate white colour, having a small dark-red spot at their base. I only once before met with the like variety, which was also near Norton, more than twenty years ago; and which is recorded in the late Mr. Winch's 'Flora of Durham and Northumberland.' As far as I can find, no notice is taken of this variety, as a wild plant, in any other Flora of British plants.

The second is, the European Strawberry-tree, or *Arbutus unedo*, of which the varieties here presented are Irish specimens. After a search among our English and Irish works on native plants, I was surprised not to find any mention of these very distinct variations in the form and breadth of the leaves. The one, which I term var. *latifolia*, is a truly noble tree, its leaves much resembling those of the bay-tree, or *Laurus nobilis*, but with their tips often rounded. It is also very robust in its habit, and attains a large size. It was growing in the fissures of the compact grey limestone on the margin of the Torc Lake, or as it is otherwise named, the Middle Lake, at Killarney. The second, which I call var. *angustifolia*, I gathered from a small tree deeply rooted in the crevices of the same limestone rock, on the shore of the lower lake, on the same day, Aug. 21st last. This variety possibly agrees with the var. 7, *salicifolia*, 'willow-leaved,' of the London nurserymen, as mentioned at p. 1118 of Loudon's 'Arboretum et Fruticetum Britannicum,' vol. ii. edit. 2. I will not here enter on the disputed question of the indigenousness of this beautiful tree, now so abundant about Killarney; but I will only observe against the affirmative side, that none of the Arbutus wood has ever, so far as I could learn from many inquiries in the island, been dug up with the other common sorts of bog-wood, among the peat or bogs of the south-west of Ireland.

In the town of Killarney there exists a considerable manufacture of work-boxes, writing-desks, tables, tea-caddies, cardcases, and other fancy articles of varied and beautiful design, made with thin slices of the *Arbutus-wood,* veneered with skill. Numbers of the poorer class thereby gain a very good livelihood.

The third plant is perhaps only a remarkably large and luxuriant variety of *Astragalus hypoglottis*; or, indeed, it may ultimately be proved from its mature pods to be a distinct and foreign species. I first discovered three or four individuals of it in the summer of 1856, which were growing on the side of the West Hartlepool railway, near the Greatham viaduct in the county of Durham; but the dried specimens which I now exhibit, were gathered in July last, from one of the plants seen by me last year. For the better comparison of the ordinary form of *A. hypoglottis* with this abnormal one, I have attached also a dried and very old specimen of the true "Purple Mountain Milk-Vetch," which was gathered near the Queen's Ferry, Edinburgh.

Smith, in his 'English Flora,' vol. iii. p. 295, gives the entire length of the stem of the normal plant in Britain, as varying from "2–5 inches," and its leaflets are usually "small and ovate"; or rather, as Sir W. Hooker states, "elliptico-ovate." Withering also, in his 4th edition, vol. iii. p. 269, describes the number of leaflets in each leaf as from "six to twelve pairs with an odd one," terminating the leaf; and Mr. Babington says the leaflets are "in eight to ten pairs." Now, in my recent and larger specimens, the stems varied from about 12 to 14 inches in length, the entire stem being stronger but more straggling; the leaves containing fourteen or sixteen pairs of leaflets and a terminal one: the leaflets themselves are less ovate, and more elongated or lanceolate. The flowering stems are nearly double the length of those of the ordinary plant; the flowers are more numerous, and the flower-heads are larger and stouter. Indeed, the whole plant is altogether more robust and upright; and if a variety of *A. hypoglottis,* it presents a very luxuriant condition. At first I was inclined to think that it might be a foreign species (and from further examination of it I retain the same inclination) introduced with ballast, as it was found on the side of a railway only a few miles distant from a considerable seaport, West Hartlepool; and the ballast or ground in which it was growing was a mixture of sand and sea-shells much broken. But had it been growing in a very rich soil, this might have accounted for its remarkable luxuriance of size, and might have induced one to suggest that it might be cultivated, like tares or saintfoin, as food for cattle, with every prospect of success.

I have very recently, with the kind assistance of Mr. Kippist, looked over the species of *Astragalus*, which are preserved in the Linnean and Smithian Herbaria. In Linnæus's collection I did not see any foreign plant at all resembling it; but in Smith's own Herbarium, in the sheet of paper containing many dried specimens of *A. hypoglottis*, the variety marked No. 6 approaches my plant in the form of its leaflets, though not in the number of their pairs. This variety is an Asiatic one, being underwritten "Caucasus," communicated doubtless by Fischer. It is evidently a mere variety of our English *A. hypoglottis*, and retains its chief characters, the leaves excepted.

I next examined the plates in DeCandolle's beautiful 'Astragalogia,' and observed in his engraving (Tab. 12) of *Astragalus purpureus*, a very considerable resemblance to my plant in its length of stem, its somewhat straggling character, and its general appearance; although its head of flowers is not represented so large, or its leaflets sufficiently long. It is a native of the South of France, chiefly growing in the mountains of Provence.

I will now briefly add DeCandolle's distinctions between *A. hypoglottis* and *A. purpureus*. In his later work, the 'Prodromus Syst. Naturalis,' tom. ii. p. 281, he describes, No. 1, *A. hypoglottis*, ... as "piloso-subvillosus".... "foliolis obovatis oblongis, sæpe emarginatis 8–10 jugis;" and its pod with one seed in each cell or division; whilst No. 3, *A. purpureus*, he details as being "subvillosus".... "foliolis obovatis apice bidentatis," and its pod as having in each division three seeds. Hence the chief differences, besides the seeds, between *A. hypoglottis* and *A. purpureus*, so pointed out, are the less hairiness of the latter plant, and the leaflets furnished at their tips with two small teeth: and, since the leaflets are more fully described in the 'Astragalogia,' I will here give the passages relating to them :—

"*A. hypoglottis.*—.... foliola 19–29, opposita, ovata aut ovato-oblonga, 3–8 millim. longa, obtusa aut sæpe in eadem planta apice emarginata, subtus incano-villosa; superne glabra aut pilis quibusdam onusta." (p. 118.)

"*A. purpureus.*—.... foliola 23–29 opposita, ovato-oblonga, apice emarginata, vel potius bidentata et in sinu brevissime mucronata, pubescentia, aut villosa, 7–9 millim. longa." (p. 117.)

In the number of pairs of leaflets in the former plant there seems to be some error, for DeCandolle makes them 9–14, with an odd one, whereas in our English plant the pairs are only 6–12 at most, with an odd one; and in the 'Prodromus,' the author writes 8–10 pairs. In my variety the pairs are 14–16, with an odd one; whilst the bidentations on their tips, in any of them, are scarcely, if at all, perceptible. This, however, is a character likely to be variable in itself, and to assume in some specimens the appearance of mere emargination.

In addition to the greater length of the leaflets in my new plant, their under-sides are less hoary and villous than those of the *hypoglottis*. But I must remark, that the chief and best distinction between these two species is, if constant, the solitary seed in each cell of the bilocular pod of the *A. hypoglottis*, and the three seeds in each of that of the *A. purpureus*.

In examining, a day or two ago, with Mr. Kippist, under a lens and small microscope, an immature pod taken from the lowest flower from one of the heads of each variety or species, eight or nine ovules were plainly visible in each dissected pod; consequently, if the character be a good one, all the ovules except two,—that is, one in each cell in the pod of *A. hypoglottis*, and all, save six, in the pod of the new plant, if *A. purpureus*,—must, in ripening, continue immature or abortive. So I must wait until next summer to decide the accuracy of this distinction, when I hope to procure some mature pods from my variety, or new species. But I shall have no difficulty in obtaining the pods of *A. hypoglottis*, as this pretty plant is common on the sand-links near Hartlepool and Seaton.

Looking then to the more elongated form of the immature pod of my new specimens, and compared with the subcordiform and compressed shape of that of *A. hypoglottis*,—see fig. (*a*) of Plate 12, and figs. (*a*) and (*b*) of Plate 14, in the 'Astragalogia,' and which distinctions are apparent in the dissected young pods contained in papers B 3 and B 4;—I am more inclined to affirm that my recent plant is rather to be accounted as a variety of *A. purpureus*, without the bidentate tips of the leaflets,—the seeds having, most likely, been imported with ballast from Toulon or Marseilles to Hartlepool,—than as a variety of *A. hypoglottis*. And this opinion seems to be in some degree confirmed by the greater number of flowers in each larger head, the much longer peduncles, the greater number of pairs of leaflets, their more lanceolate form, their less hoariness and villousness, than those which respectively occur in *A. hypoglottis*[*].

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[*] After my paper was read, a gentleman present at the meeting stated that Baxter had figured, in his 'British Phænogamous Botany,' a variety of the *Plantago major*, which he thought was the same as mine. On looking, subsequently, at vol. iii. plate 207, I found that he has figured at No. 7, a small

The fourth and last plant I now submit to notice, is a most curious departure from the ordinary or normal form of *Plantago major*. I discovered three plants of it nearly together on July 13th of this year, in a meadow, at Norton, in the county of Durham. On examination, each single flower will be found to have grown into a separate spike of a close pyramidal form, and the entire flowering panicle or head to have put on a most distinct and compact pyramidal character; so the variety may be distinguished as—*pyramidalis*—paniculis pyramidalibus densis. Smith, in his 'English Flora,' vol. i. p. 214, says, "the rose-shaped variety, and the panicled one, are often kept in gardens for the sake of curiosity, and afford remarkable instances of vegetable transformation." He mentions two varieties:—"γ. *P. major*, panicula sparsa," figured in Bauhin, Hist. iii. p. 2. 503, *f.*; "δ. *P. rosea*," ibid.

On referring however to Bauhin's work, as alluded to by Smith, the woodcuts there given do not resemble my variety, which is by no means rose-shaped. In the accompanying paper (D.) I have dried two flowering heads of the usual form of the *Plantago major*, which were growing near this varied plant, in order that this curious yet very beautiful transformation may be the more distinctly apparent. The rest of the plant does not differ from the common growth of *P. major*.

Botanical Report on the North-Australian Expedition, under the command of A. C. Gregory, Esq. By Dr. FERDINAND MÜLLER, Botanist to the Expedition. Communicated by the Colonial Office.

[Read Dec. 17th, 1857.]

Sydney Botanic Garden, 20th May, 1857.

SIR,—I do myself the honour of transmitting to you a brief general report on my botanical researches, instituted during your exploration of intertropical Australia.

In order to elucidate how far I was justified to advance the general conclusions contained in the following pages, I beg to refer introductorily both to the extent and the directions of your tracks of exploration, along which I endeavoured to ascertain, not

head of the *Plantago major*, very like my transformed plant; but it seems less, and not so pyramidal in its entire form. Mr. Baxter describes it as var. η, and says it was discovered near Oxford, July 26, 1835.

only the nature of the vegetation, but also the range of its species. I beg further to observe, that I include in the following remarks all those plants which, during momentary interruptions of the voyage to the Victoria River, we were enabled to collect on the islands on the N.E. coast, as well as those obtained during our stay at Moreton Bay.

The plants thus accumulated illustrate, I think, almost completely the flora of Arnhem's Land, with the exception of the northern part, where it seems bamboo-groves and many other features of the Indian vegetation exclusively exist. They comprise further a nearly perfect flora of the Victoria River and its vicinity, as also of the dividing table-land or ranges between North Australia and the interior, less completely the vegetation of the north-western interior (as far as long. 20° 18′ south, and lat. 127° 30′ east), which may be considered as part of the flora of Central Australia. The collections formed during the last part of the expedition illustrate to a considerable extent the vegetation of the country around the south-west, south, and south-east part of the Gulf of Carpentaria, more or less remote from the coast, and finally the plants of the eastern tropical and subtropical parts of New Holland. My observations extend consequently from Point Pearce (the most northern place visited on the mainland in lat. 14° 30′ south) to Termination Lake (our last position south-west, in lat. 20° 18′ south, and long. 127° 30′ east), and north-east as far as the lower part of the Gilbert River (in lat. 17° 15′ south, and long. 141° 20′ east) and south-east as far as Moreton Bay (lat. 27° 30′, long. 153° 20′ east). Additions to the plants from these tracts of country form those procured on the islands of North-east Australia (from lat. 15° to 10° 45′ south); and although the collections from these localities are very limited in land plants, they are of some value, as throwing light upon the phycology of that part of the globe.

In arriving at the conclusions advanced in the following pages, I availed myself of R. Brown's general remarks, appended to 'Flinders's Voyage,' and to Sturt's work on 'Central Australia;' of Allan Cunningham's appendix to King's 'Intertropical Survey of Australia;' of the botanical notes scattered through Sir Thomas Mitchell's work on 'Tropical Australia,' and through Leichhardt's 'Overland-Expedition;' and of Carron's 'Narrative of Kennedy's Expedition.' Besides these works, Mr. Brown's and DeCandolle's 'Prodromi' are almost the only important sources of information on the flora of the intratropical zone of this country.

In the absence of a general work of a recent date on those plants constituting the polypetalous orders, we are, at least as regards Australia, but scantily acquainted with this section of the vegetable kingdom; and if, therefore, many plants noticed during the expedition are on this occasion pronounced as additional to the Australian flora, it is to be admitted, that some of them in all probability occur already in the collections of Allan Cunningham, of R. Brown, or even of Banks and Solander, still unrevealed to botanical science.

The number of plants observed in the whole extent of our journey amounts to nearly 2000 species, which exhibit the proportionately great number of 160 natural orders, and more than 800 genera. Monocotyledoneæ bear to Dicotyledonous plants scarcely the proportion of 1 : 4, and Acotyledoneæ (exclusive of minute fungi) 1 : 8, but with the omission of Algæ only 1 : 12. In North, North-western, and Central Australia cryptogamic plants diminish in number with the decrease of atmospherical humidity to such an extent, that their relative proportions to the rest of the vegetation is probably much smaller than in any other part of the globe, mosses and lichens being almost entirely excluded from many extensive tracts of the country.

The richest natural orders of plants observed in tropical Australia may be arranged according to the preponderance of species in the following series: viz. *Leguminosæ, Myrtaceæ, Compositæ, Cyperoideæ, Algæ, Euphorbiaceæ, Rubiaceæ, Filices, Proteaceæ, Malvaceæ, Goodeniaceæ, Solanaceæ, Convolvulaceæ, Sapindaceæ, Scrophularinæ*, &c. But this series, applying to the accumulation of plants from all the country traversed, has to receive considerable alteration in adapting it exclusively to the north-west portion of the continent, where *Compositæ, Euphorbiaceæ, Rubiaceæ*, and *Filices* exist only in a much diminished proportion.

The expedition has not disclosed a single new fundamental form of the vegetable kingdom in the type of a new natural order, unless such should be exhibited yet by any of those, which were seen in a state too imperfect for accurate classification, and were consequently excluded from the appended systematical list. But *Hippocrateæ, Alangiaceæ, Hydrophylleæ, Ephedreæ*, and *Pontederiaceæ* are now for the first time introduced into the Australian flora. The genera, richest of all, are to be arrayed according to their predominance in the following succession:—*Acacia, Eucalyptus, Solanum, Panicum, Fimbristylis, Grevillea, Goodenia, Hibiscus, Ipomœa, Stylidium, Mitrasacme, Andropogon, Cyperus, Sida, Crotalaria, Indigofera, Loranthus, Ficus*, &c.

Of natural orders, more or less extensively represented in the extratropical parallels of Australia, none were noticed of the following beyond the tropic of Capricorn in a complex of lines of exploration exceeding 5000 miles, and in an extent of 22° of longitude and 9° of latitude; viz. *Ranunculaceæ*, *Hydropeltideæ*, *Tremandreæ*, *Geraniaceæ*, *Rosaceæ*, *Callitrichineæ*, *Crassulaceæ*, *Cunoniaceæ*, *Mesembryanthemeæ*, *Caprifoliaceæ*, *Epacrideæ*, *Plantagineæ*, *Irideæ*, and *Hypoxideæ*. Besides these, none of the following were noted in North or North-western Australia, viz *Anonaceæ*, *Aurantiaceæ*, *Hippocrateæ*, *Erythroxyleæ*, *Xanthoxyleæ*, *Cedreleæ*, *Alangiaceæ*, *Escallonieæ*, *Araliaceæ*, *Oleineæ*, *Piperaceæ* and *Aphyllanthaceæ*: and these are foreign to North-western Australia in addition to the former:—*Cruciferæ*, *Guttiferæ*, *Oxalideæ*, *Passifloreæ*, *Primulaceæ*, *Scitamineæ*, *Junceæ*, *Restiaceæ* and *Xerotideæ*.

Amongst the plants remarkable for their geographical distribution, the Gouty-stem tree (*Adansonia Gregorii*) is deserving of particular notice, since this expedition proved its generic identity with the Baobab or Monkey-Breadtree of Western Africa, which has hitherto remained the isolated representative of its genus. The Australian species, resembling its prototype most strikingly in the often colossal thickness of its stem and in its singular ramification, is evidently restricted to the north-western part of this continent, where Allan Cunningham assigned to it a range of 4° of longitude, and where the same extent of latitude limits its existence. The fruits, borne on a short stalk, contain a dry acidulous pulp, similar to that of *Adansonia digitata*.

Of two endemic kinds of *Cochlospermum* (Silk-cotton trees), one was found to be a native only of North-western Australia, whilst the other extended from around the Gulf of Carpentaria as far as Porter's Range on the Burdekin. A species of *Datura* (allied to *D. alba* of East India) is truly indigenous in the eastern interior: a *Calamus* ranges as far south as Moreton Bay; a second species of the New Zealandian genus *Teucridium* occurs in the hotter parts of Eastern Australia; an undescribed *Gossypium* (mentioned already by A. Cunningham) is dispersed throughout the tropics of this country; a third species of *Pandanus* indicates generally the permanency of fresh water; and the only indigenous *Sciadophyllum* seems to be analogous with *Sc. macrostachyum* of New Guinea, and occurs, according to the observations of Mr. C. Moore, as far south as Wide Bay. I may also draw attention to the wide northern range of the following genera, known formerly only from the extratropical zone of Australia; viz. *Seringia*, *Ke* *raudrenia*, *Rulingia*, *Oxylobium*, *Gompholobium*, *Lhotskya*, *Tryptomene*, *Astartea*, *Harmogia*, *Therogeron*, *Cyclotheca*, *Eremophila*, *Pholidia*, *Pithyrodia*, *Halgania*, and *Cladium*. Not less than sixty genera were observed during the progress of the expedition, which, although established in the floras of other countries, remained unnoticed by any writer on Australian botany: viz. *Stephania*, *Abelmoschus*, *Adansonia*, *Helicteres*, *Melochia*, *Riedleya*, *Melhania*, *Ximenia*, *Glycosmis*, *Hippocratea*, *Bergia*, *Nephelium*, *Cardiospermum*, *Azadirachta*, *Westonia*, *Wistaria*, *Agati*, *Æschynomene*, *Lourea*, *Dicerma*, *Taverniera*, *Atylosia*, *Rhynchosia*, *Tephrosia*, *Parinarium*, *Lumnitzera*, *Ludwigia*, *Luffa*, *Zehneria*, *Trianthema*, *Sesuvium*, *Mappa*, *Baloghia*, *Bridelia*, *Leptonema*, *Pluchea*, *Spilanthes*, *Soliva*, *Haplotaxis*, *Alstonia*, *Cerbera*, *Melodinus*, *Hydrolea*, *Bonnaya*, *Peplidium*, *Rhamphicarpa*, *Adhatoda*, *Dicliptera*, *Adenosmos*, *Teucridium*, *Helicia*, *Ephedra*, *Ouvirandra*, *Aponogeton*, *Hydrocharis*, *Cyanotis*, *Typhonium*, *Oryza*, *Campyloneuron*, and *Ceratopteris*.

A number of genera, at least quite as large as that of the preceding series, are not referable to any hitherto described, and will prove, I trust, a valuable contribution towards the botanical system, inasmuch as the discovery of new generic types assists in disclosing the laws of affinity in nature, connecting often those forms which are isolated by wide chasms, and aiding thus in the advancement and accomplishment of a truly natural system of the whole existing vegetation.

The amount of plants added by our travels to the Australian flora approaches to 800 species. A few of them are incidentally mentioned in the works previously quoted, none however introduced by systematical descriptions. How many of these are really new to science, and how many identical with Indian or Pacific forms, can only be ascertained by a comparison of European collections, and by access to a more extensive library than I have here at my command. Still I am under the impression that at least 500 of the additional plants are peculiar to Australia, and these must therefore be considered as contributions entirely new to botany.

According to a computation instituted in 1849 by R. Brown (in the Appendix to Sturt's 'Central Australia,' ii. pp. 90, 91), the number of plants known from New Holland and Van Diemen's Land scarcely amounted to 7000. Botanical researches in West Australia, Tasmania, South Australia and the colony of Victoria, have added since from places formerly inaccessible, exclusive of Cryptogamia, at least 1000 species.

Assuming that the increase of new Australian cryptogamic plants comprises 500 species, which cannot be considered overrated, when we remember how far alone our marine flora, through the investigations of Professor Harvey, became augmented; and if only, of those plants which resulted from the North Australian expedition, 500, as mentioned before, are regarded as wanting in the existing former collections;—I believe we may then safely assume, that we are at present more or less acquainted with 9000 Australian plants.

The scantiness of the vegetation observed by Capt. Sturt and by us towards Central Australia; the very limited number of new plants contained in a considerable collection formed by Mr. Wilhelmi, west of Spencer's Gulf; the extensive range of identical species along the tropical east coast, and your own observations on the decrease of plants towards the interior of Western Australia;—are sufficient reasons to anticipate, that botanical travellers in future will add scarcely 1000 truly distinct plants to those hitherto accumulated, and that, consequently (with the omission of minute fungi), the vegetable empire of all Australia, inclusive of Tasmania, does in all probability not comprise above 10,000 species.

Many of the indigenous vegetable productions proved eminently useful to the expedition; still it cannot be denied that their number, as far as ascertained, remains exceedingly limited, compared with the total of the plants observed; and attention has already been directed to most of them by Dr. Leichhardt; but in consequence of an extensive loss of specimens, he was deprived of the opportunity of determining many of those useful plants with botanical accuracy; and I shall therefore offer our own observations.

Nymphæa gigantea and a second species, both allied to the sacred Lotus of the ancient Egyptians (*Nymphæa lotus*), adorn in a variable shade of colours everywhere the waters of the warmer zone of Australia. The seed-vessels and the roots of these water-lilies form a large proportion of the vegetable food of the northern natives, and the former particularly will always be regarded as a providential gift in cases of need, by explorers of the North Australian wilderness. Yet more valuable, but less frequent, is *Nelumbium speciosum*, which reaches to East Australian extratropical latitudes. Being identical with the well-known Pythagorean Bean, it is needless to repeat here the uses of a plant which has been famous since the remotest antiquity. During the greater part of the journey, we were more or less extensively supplied with indigenous fruits. Thus the acidulous drupes of three Meliaceous trees (belonging to a new genus of the Trichilious section), the Nonda fruit of Dr. Leichhardt (now referred to *Parinarium*, and also observed on the islands of Torres Strait), a small kind of cucumber, a species of rose-apple (*Jambosa eucalyptoides*), the fruit of *Mimusops Kauki* (a plant restricted to the north-east coast), that of a broad-leaved species of *Terminalia*, the berries of *Physalis parviflora*, the small Lemon of the Brigalow Scrub (*Triphasia glauca*), the berries of Leichhardt's bread-tree (*Gardenia edulis*);—all these were periodically enjoyed, and added often to our diet those vegetable components so essentially required in the torrid zone. In this regard, we had almost daily occasion to praise the value of the purslane (*Portulaca oleracea*), which not only occurred in every part of the country explored, but also—principally in the neighbourhood of rivers—often in the greatest abundance. We found it, in sandy and grassy localities, so agreeably acidulous, as to use it for food without any preparation; and I have reason to attribute the continuance of our health, partially to the constant use of this valuable plant. The absence of other antiscorbutic herbs in the north, and the facility with which it may be gathered, entitle it to particular notice.

The Australian spinach (*Chenopodium erosum*), the New Zealandian (*Tetragonia expansa*), and the watercresses (*Nasturtium terrestre* and *Cardamine hirsuta*), which are in utility equal to the purslane, are almost confined to East Australia.

The clustered fig, the produce of a seemingly undescribed arborescent *Ficus*, proved second in importance only to the *Portulaca*, but was rarely available, except along the rivers of East and North-east Australia; and the native Mulberry (*Morus Calcar galli*) was nowhere noticed except on the subtropical portion of the east coast. The tender parts of the stem, and the base of the leaves of *Cymbidium canaliculatum*, the only orchid of the interior of tropical Australia, afforded a mucilaginous food; and the foliage of a *Hibiscus*, closely allied to *H. heterophyllus*, served as a substitute for sorrel. The gum of the *Terminalias*, *Sterculias*, and *Acacias* was seldom obtained, perhaps only in consequence of a season unfavourable for its exudation.

Livistonia inermis and an allied species supplied us occasionally with palm-cabbage; a similar substance, yielded by the Screwpines (*Pandanus spiralis* and *P. aquaticus*) seemed to be quite harmless, although it retained, even after boiling, some acidity.

In addition to these, there remain to be mentioned, the "Mackenzie Bean" (*Canavallia Baueriana*), the yam (*Dioscorea*), the tubers of *Aponogeton* and *Ouvirandra*, which are of a most agreeable taste, and the root of *Typha*. But the Tacca-tubers are only useful in the preparation of starch.

The plan of the expedition, according to which such an extensive part of the country was to be explored within a limited period, scarcely admitted of an inquiry into the qualities of the timber or into the medicinal or economical properties of the plants we met with, even in those cases where they were expected to exist.

With regard to the former, we regretted to observe in the northern and north-western portion of the continent almost generally the want of that size and regularity of growth for which many of the common trees are so much valued in the colonized parts of Australia. *Melaleuca Leucadendron* (the Indian Cajuput tree) forms the largest and straightest timber tree in the north. Pines were, with the exception of a solitary *Callitris*, nowhere observed except towards the east coast, and Casuarinas are wanting in the vicinity of the Victoria River; whilst our only northern species of this genus (*C. equisetifolia*), a timber-tree of the South-Sea Islands and of the coast tracts of India and Africa, was of universal occurrence around the Gulf of Carpentaria and on the east coast. The stately *Casuarina Decaisneana* we discovered in the sandy desert of Central Australia.

Of *Eucalyptus* occurred not less than 40 species. Two of these retain a scrubby habit and belong exclusively to the inland desert. Of the other species, the Flooded Gum-tree (*E. rostrata*, Schl., *E. acuminata*, Hook.), which is identical with the Yarra-tree of Sir T. Mitchell, and with the red Gum-tree of the South Australian colonists, was found to be universally distributed over the country. Its timber is well known for its durability and being capable of receiving a beautiful polish. Many of the Gum-trees are in their distribution limited by the dividing ranges, but that species named by the colonists "Moreton Bay Ash," advances to the south-east part of the Gulf of Carpentaria, whilst the so-called "Iron-bark tree," when suddenly appearing with the fall of the eastern waters, becomes at once a universal timber-tree.

Mr. C. Moore, who demonstrated the utility and unusual variety of the timber of East Australia so well in the Paris Exhibition, informs us that it is not *Oxleya xanthoxyla*, which supplies the kind of yellow wood, which attained some celebrity in New South Wales. According to an examination of the fruit, it is yielded by a second species of *Azadirachta*. The only indigenous *Erythroxylon*, a small tree not uncommon in East Australia, produces in all probability a red dye similar to that of its congeners.

With regard to the medical properties of the plants, observed during the expedition, I may allude to the tonic bitterness of several *Goodeniaceæ*, of *Canscora diffusa* (which is identical with *Orthostemon erectus*, R. Br.), and of a new genus of *Simarubeæ* (*Picroxylon*), with a wood similar to that of *Quassia*. The *Eucalyptus kino* might be procured in boundless quantities. The bark of the Red Cedar-tree (*Cedrela Australis*) seems to offer a good substitute for that of *Cedrela Toona* and *C. febrifuga*.

The occurrence of some virulent vegetable poison in North-west Australia manifested itself by the loss of several of our horses on three occasions, and I deplore that I failed to ascertain the plant which caused this calamity. In its effects this poison is even more active than that of *Gastrolobium* and *Gompholobium*, which are so destructive to the herds of Western Australia, and its action on the stomach of the animals inflammatory in a high degree. These losses happened on the rocky edges of the sandstone tableland near rivulets lined with *Pandanus spiralis*; but I searched in vain in these localities for plants, the natural alliance of which would justify any suspicion.

My previous remark on the preponderance of grasses, does not merely allude to their diversity in species, but applies equally to their gregarious distribution over a great part of the country. Numerous species of *Panicum* and *Andropogon*, several of *Anthistiria*, *Poa*, *Sporobolus*, *Ectrosia*, *Eriachne*, *Saccharum*, and *Rottboellia*, a *Paspalum*, a *Dactyloctenium*, a kind of rice, and many other grasses of equal value for pasture, cover either the basaltic plains, the valleys, or the fertile undulations. An *Ischæmum*-reed of vast abundance on the banks of the Victoria River offered additional food for our horses. But all the extensive sandstone elevations are devoid of nutritious forage, and the harsh or rigid forms of *Triodia*, *Aristida*, and *Triraphis* supersede the tender grasses of the lower ground.

The rainy season, which we observed to last from November till January, renews with a wonderful rapidity the grasses and the herbaceous vegetation at the hottest season. To this circumstance we have principally to ascribe the continuance of grass in a nutritious state throughout a longer period of the year than in many of the southern tracts of Australia. Dew and occasional showers of rain renew, even to some extent, the grasses in the cooler season, more particularly in localities denuded by bush-fires.

It would lead beyond the limits of this document to contemplate the botany of the country in its full details, but I may sketch the principal distinctive features of the vegetation, which in a comprehensive view can be divided into the following groups:—

1. Plants of the dense coast-forests.
2. „ of the Brigalow scrub.
3. „ of the open downs.
4. „ of the desert.
5. „ of the sandstone table-land.
6. „ of the sea-coast.
7. „ of the banks and valleys of rivers.

The first division, designated by the colonists the brushwood or cedar country, is characterized prominently by a great variety of umbrageous trees, chiefly of an Indian type. These forests occupy the slopes of ranges fronting the east coast, and seem to be dependent, not only on climate, but also, at least in some degree, on the decomposition of schistaceous rocks. The monotony of *Eucalyptus* here gives way to trees of the meliaceous, cedrelaceous, sapindaceous, euphorbiaceous, celastrinaceous, rubiaceous, and laurineous orders, intermixed with *Acronychia*, *Castanospermum*, *Erythrina*, *Ficus*, *Eupomatia*, and trees of other genera, often interrupted by a vast prevalence of noble Araucarias, matted together into an impervious thicket by *lianes* of *Calamus*, of asclepiadeous, apocynaceous, convolvulaceous, menispermaceous, and ampelideous plants, and harbouring in their shade numerous parasitical orchids and ferns.

2. The Brigalow scrub, peculiar apparently to a rather argillaceous sandstone, stretches in East Australia over the elevated plains west of the coast range as far north as Newcastle range; and some of its plants transgress even the elevations which separate the waters of the east coast from those of the Gulf of Carpentaria. Its plants are varied in the extreme; typical of it are, however, shrubs or small trees of *Capparis*, *Pittosporum*, *Heterodendron*, *Triphasia glauca*, *Geijera*, *Brachychiton*, *Cassia*, *Acacia*, *Myoporum*, *Canthium*, *Ehretia*, *Bauhinia Hookeri* and *Bauhinia Carroni*, *Anthobolus leptomerioides*, *Delabechea rupestris*, and principally *Eremophila Mitchelli* and *Strzeleckia dissosperma*. *Eucalypti*, often of considerable size, are dispersed through the Brigalow scrub. In a modification of this botanical feature of the country,

distinguished as the Bottletree scrub, *Delabechea*, *Bauhinia* and *Brachychiton* prevail, seemingly ruled by the presence of basalt, conglomerate, or lime.

3. The open downs of basaltic origin are in many instances surrounded by the Brigalow, or are bordered by the desert. Except along the watercourses, they are nearly destitute of trees, and for the greater part of the year utterly devoid of water. The rich soil readily absorbs the rain, and produces thus a luxuriant herbaceous vegetation. Grasses are here, as stated before, abundant, and cannot in their pastoral value be surpassed. Plants of the genera *Abelmoschus*, *Hibiscus*, *Sida*, *Crotalaria*, *Sesbania*, *Neptunia*, *Cucumis*, *Wedelia*, *Wollastonia*, *Spilanthes*, *Glossogyne*, *Portulaca*, *Gomphrena*, *Pimelea*, *Commelyna*, *Cæsia*, *Bulbine*, &c. are conspicuous, and a marked increase of *Compositæ* is perceptible in those parts of this formation nearest to the eastern coast, where also the occurrence of a new *Verbena* suggested the appellation "Vervain plains" for a certain tract of this country.

4. The desert is, according to the varied character of its sandy, saline, or argillaceous soil, extremely changeable in its flora; but the generality of its plants agrees so well with the genera, and even species, of the barren tracts of the south, as to render their explication here unnecessary. *Trianthema*, *Newcastelia*, *Microcassia*, *Gomphrena*, *Ptilotus*, and a few other desert plants seem not to spread far southward. Acacia forests cover the rising ground.

5. The sandstone table-land forms in its endless extent a landscape equally arid and cheerless. *Eucalypti*, often diminutive, some with lamellar bark and brilliant orange and scarlet flowers, a dwarf *Thouinia*, some *Hibisci*, *Brachychiton ramiflorum*, *Cochlospermum*, *Dodonææ*, *Distichostemon*, *Corchorus*, *Owenia*, *Boronia*, *Zizyphus*, *Buchanania*, *Terminaliæ*, *Jacksoniæ*, *Oxycladium*, *Nematophyllum*, *Bossiæa*, *Indigofera*, *Psoralea*, *Zornia*, *Atylosia*, *Erythrina Vespertilio*, *Bauhinia Leichardtii*, *Laboucheria* (the leguminous Iron-bark tree of Dr. Leichhardt), numerous Acacias, various species of *Calycothrix* and *Melaleuca*, *Lhotzkya cuspidata*, *Verticordia Cunninghami*, *Xanthostemon paradoxus*, *Gardenia*, *Petalostigma*, *Scævolæ*, *Goodeniæ*, *Sersalisia*, *Strychnos*, *Spathodea*, many species of *Heliotropium*, *Balfouria saligna*, *Gyrocarpus sphenopterus*, *Persoonia falcata*, *Hakea arborescens*, a considerable number of *Grevilleas*, and *Santalum lanceolatum* constitute, with the above-mentioned *Aristida*, *Triodia* and *Triraphis*, its principal vegetation, *Livistona inermis* gracing now and then its declivities.

6. For the characteristics of the sea-coast we have principally to

refer to the mangrove plants with their usual companions, viz. *Ceriops*, *Rhizophora*, *Bruguiera*, *Avicennia*, *Suriana*, *Ægiceras*, *Ægialitis*, *Pemphis*, &c. On the sandy coast, *Colubrina asiatica*, *Pandanus*, *Spinifex fragilis*, *Triumfetta procumbens*, *Tribulus*, &c., are conspicuous.

7. The following plants are, along the banks of the northern rivers, of frequent occurrence:—the broad-leaved *Terminalia Chuncoa* (the raspberry-tree of Leichhardt), *Jambosa eucalyptoides*, *Morinda Leichhardtii*, *Inga moniliformis*, *Warringtonia*, *Agati*, *Polygonum Cunninghami* (which surrounds also frequently the lagoons of the interior), *Pandanus*, *Melaleuca Leucadendron*, *Eucalyptus rostrata*, &c., whilst the vegetation of the grassy valleys bears a resemblance to that of the basaltic downs.

Several other localities with a vegetation of their own, but of less extent or not sufficiently known, cannot be noted on this occasion. Thus the porphyritic ranges which separate the rivers of the Gulf of Carpentaria from those of the eastern coast, the granitic valley of the Nicholson, and other places, are productive of plants which rely upon peculiar geological structures.

I beg to transmit with this report the remaining number of systematical descriptions of new or rare plants, drawn up almost exclusively on the spots of discovery, and which illustrate, with the addition of those forwarded on the former occasions, nearly 600 species; but I have to regret, that in consequence of the destruction of part of the botanical collections on board of the "Messenger," I am not enabled to accompany, in a few instances, these manuscripts with corresponding specimens.

I beg also to append to this communication two lists of plants. In the first I have endeavoured to determine the northern limits of 243 species from the more southern latitudes of Australia, which gradually appeared on the lines of exploration from lat. 17° 30′ south, to lat. 27° south. Probably a slight variation in their range will be observed hereafter under other meridians: still I believe that the limits assigned to them will be found approximately correct for the eastern part of the country within a moderate distance from the coast. The second Appendix contains a systematical catalogue of nearly all the genera of plants observed during the journey, with their respective number of species; and this may serve as an outline of the tropical vegetation of Australia.

In conclusion, I perform a pleasing duty in acknowledging most thankfully the ample opportunities offered by yourself for the prosecution of my labours, which I found facilitated to the fullest extent, as far as circumstances would permit.

I have also to acknowledge contributions towards the botanical collections from all the officers of the expedition, and although those additions yielded but a very small number of species not observed by myself, yet I was thus enabled to reexamine many plants in a more perfect state of development.

I am placed under the greatest obligation to Mr. Walter Hill, Curator of the Brisbane Botanic Garden, not only for communicating some valuable and unique specimens, but also for his disinterestedness in assisting me with his local knowledge of the Moreton Bay district, in obtaining many botanical rarities which I otherwise should have failed to procure; and it remains for me to express likewise my thanks to Mr. C. Moore, Director of the Botanic Garden at Sydney, for providing me with ample room for arranging the herbarium, for giving me unlimited access both to the library and the collections of his establishment, and for rendering numerous services to alleviate my labours in Sydney.

To his Excellency the Governor-General I owe the deepest gratitude for entrusting to me the phytological investigation of such an ample and interesting tract of country, a favour, which I can—reflecting on the rarity of such occasions for research—never sufficiently acknowledge; and finally, I feel proud to state, that, through the usual liberality of Sir William Hooker, I am permitted by Her Majesty's Government to retain a set of botanical specimens, in order to elucidate hereafter to the fullest extent the flora of tropical Australia.

I have the honour to be, Sir,
Your most obedient and humble servant,
FERDINAND MULLER,
Botanist to the North-Australian Expedition.

APPENDIX I.

Showing the range of Extratropical Australian Plants towards the North, as observed during the North-Australian Expedition.

From lat. 17° 30′ *to* 18° 30′ *south.*

Polygonum plebeium, ***R. Br.***
Solanum verbascifolium, ***L.***
——— nigrum, ***L.***
Teucrium argutum, ***R. Br.***
Eremophila Mitchelli, ***Benth.***

From lat. 18° 30′ *to* 19° *south.*

Chenopodium erosum, ***R. Br.***
Bauhinia Hookeri, ***Ferd. Mull.***
Vittadinia cuneata, ***D.C.***
Plectranthus parviflorus, ***W.***
Ruellia Australis, ***R. Br.***

Eranthemum variabile, *R. Br.*
Helichrysum lanuginosum, *A. Cunn.*
Oxalis corniculata, *L.*
Hydrocotyle asiatica, *L.*
Calotis scapigera, *Hook.*
——— dilatata, *A. Cunn.*
Verbena officinalis, *L.*
Strzeleckia dissosperma, *F. Muller.*

From lat. 19° to 20° south.

Geijera latifolia, *Lindl.*
Nasturtium terrestre, *R. Br.*
Xerotis longifolia, *R. Br.*
Rytidochlamys Mitchelli, *Sond.*
Rumex Brownii, *Campd.*
Siegesbeckia orientalis, *L.*
Juncus pallidus, *R. Br.*
Usnea barbata, *Ach.*
Alyxia ruscifolia, *R. Br.*
Lythrum Hyssopifolium, *L.*
Convolvulus erubescens, *Sims.*
Polygonum lapathifolium, *H. Kew.*
Gnaphalium involucratum, *Forst.*
Eclipta erecta, *L.*
Heterodendron oleifolium, *Desf.*
Azolla pinnata, *R. Br.*

From lat. 20° to 21° south.

Canthium oleifolium, *Hook.*
Scævola spinescens, *R. Br.*
Dipodium punctatum, *R. Br.*
Goodenia geniculata, *R. Br.*
Anthobolus leptomeroides, *n. sp.*

From lat. 21° to 22° south.

Velleya macrocalyx, *Vriese.*
Goodenia hederacea, *R. Br.*
Myoporum dulce, *Bth.*
Senecio rupicola, *Less. & Rich.*
Pholidia polyclada, *Ferd. Muller.*
Triphasia glauca, *Lindl.*
Cassia circinata, *Bth.*
—— canaliculata, *R. Br.*

From lat. 22° to 23° south.

Pomax Solandri, *Ferd. Muller.*
Tricoryne scabra, *R. Br.*
Erechthites, *sp.*
Daucus brachiatus, *Sieb.*
Calotis microcephala, *Bth.*
Abutilon diplotrichum, *F. Muller.*
Ajuga Australis, *R. Br.*
Acacia juniperina, *W.*
Blitum glandulosum, *Moqu.*
Picris angustifolia, *D.C.*
Cassia platypoda, *R. Br.*

From lat. 23° to 24° south.

Bulbine bulbosa, *R. & S.*
Indigofera brevidens, *W.*
Scævola microcarpa, *Cuv.*
Swainsonia coronillifolia, *Salisb.*
Hypoxis hygrometrica, *Labill.*
Psoralea tenax, *Lindl.*
Pycnosorus globosus, *Bth.*
Thysanotus tuberosus, *R. Br.*
Aneilema graminea, *R. Br.*
Pratia Cunninghami, *Hook. fil.*
Mimulus gracilis, *R. Br.*
Tetragonia expansa, *L. fil.*
Zygophyllum apiculatum, *F. Mull.*
Atriplex semibaccata, *R. Br.*
Lespedeza juncea, *Pers.*
Andropogon Sieberi, *Kunth.*
Asperula divaricata, *Bisch.*
Pimelea microcephala, *R. Br.*
Stackhousia asperococca, *Salisb.*
Polygonum prostratum, *R. Br.*
Cuscuta Australis, *R. Br.*
Brachycome graminea, *F. Muller.*
Carex inversa, *R. Br.*
Cyperus enervis, *R. Br.*

From lat. 24° to 25° south.

Funaria hygrometrica, *Hedw.*
Brachychiton populneum, *R. Br.*
Cassia vittata, *R. Br.*
Rubus macropodus, *Séringe.*
Xanthorrhœa arborea, *Sm.*
Macrozamia spiralis, *Miqu.*
Adiantum Æthiopicum, *W.*
——— hispidulum, *Sm.*
Poranthera microphylla, *Brongn.*

Pimelea glauca, *R. Br.*
Velleya paradoxa, *R. Br.*
Hydrocotyle densiflora, *D.C.*
Thesium Australe, *R. Br.*
Exocarpus cupressiformis, *Labill.*
Leuzea Australis, *D.C.*
Helipterum punctatum, *D.C.*
Cassytha paniculata, *R. Br.*
Scirpus maritimus, *L.*
——— lacustris, *L.*
Ranunculus lappaceus, *Sm.*
Cynoglossum Australe, *R. Br.*
Dichondra repens, *R. Br.*

From lat. 25° *to* 26° *south.*

Plantago debilis, *R. Br.*
Angophora eucalyptoides, *F. Mull.*
Scirpus mucronatus, *L.*
Calotis dentex, *R. Br.*
Pultenæa retusa, *Sm.*
Mentha saturejoides, *R. Br.*
Veronica calycina, *R. Br.*
Sambucus Gaudichaudiana, *D.C.*
Polygonum gracile, *R. Br.*
Cyperus venustus, *R. Br.*
Clematis glycinoides, *D.C.*
Solanum aviculare, *Forster.*

From lat. 26° *to* 27° *south.*

Juncus prismatocarpus, *R. Br.*
Goodenia bellidifolia, *Sm.*
———— paniculata, *Sm.*
Opercularia varia, *Hook.*
Pimelea gracilis, *R. Br.*
Brasenia peltata, *Pursh.*
Potamogeton obtusifolius, *Mert. & Koch.*
Brunonia sericea, *Sm.*
Gratiola pedunculata, *R. Br.*
Viola betonicifolia, *Sm.*
Daviesia ulicina, *Sm.*
——— ruscifolia, *A. Cunn.*
Lepidium hyssopifolium, *Desf.*
Stylidium graminifolium, *Sm.*
Beyera oblongifolia, *Kl.*
Carex appressa, *R. Br.*
Morinda jasminoides, *A. Cunn.*
Polygala veronica, *Ferd. Muller.*
Microtis parviflora, *R. Br.*
Cladium junceum, *R. Br.*
Cycnogeton Huegelii, *Endl.*
Cinna ovata, *Kunth.*
Harmogia virgata, *Schauer.*
Pteris esculenta, *Forst.*
Platycerium alcicorne, *Desv.*
Davallia pyxidata, *Sm.*
Cynoglossum latifolium, *R. Br.*
Rubus rosæfolius, *L.*
Caustis pentandra, *R. Br.*
Carex longifolia, *R. Br.*
—— littorea, *Labill.*
Lycopus Australis, *R. Br.*
Viola hederacea, *Labill.*
Lepidosperma exaltatum *et* laterale, *R. Br.*
Juncus vaginatus, *R. Br.*
——— maritimus, *Lam.*
Polygonum strigosum, *R. Br.*
Festuca littoralis, *Labill.*
Microlæna stipoides, *R. Br.*
Billardiera scandens, *Sm.*
Jonidium filiforme, *D.C.*
Drosera binata, *Labill.*
——— peltata, *Sm.*
Comesperma acutifolium, *Steetz.*
———— retusum, *Labill.*
Tetratheca ciliata, *Labill.*
Polycarpon alsinifolium, *D.C.*
Commersonia Fraseri, *Gay.*
Geranium pilosum, *Forst.*
Erodium cygnorum, *Nees.*
Phyllota squarrosa, *Bth.*
Aotus villosa, *Sm.*
Dillwynia ericifolia, *Sm.*
Pultenæa villosa, *Sm.*
———— retusa, *Sm.*
Hovea linearis, *R. Br.*
Platylobium formosum, *Sm.*
Bossiæa ensata, *Sieb.*
Kennedya splendens, *Paxt.*
Hardenborgia monophylla, *Bth.*
Acacia suaveolens, *W.*

Acacia Sophoræ, *R. Br.*
Epilobium Billardieri, *Sér.*
Tillæa verticillaris, *D.C.*
Callicoma serratifolia, *R. Br.*
Mesembryanthemum æquilaterale, *Haw.*
Actinotus Helianthi, *Labill.*
Trachymene ovata, *D.C.*
Petroselinum prostratum, *D.C.*
Astrotricha longifolia, *Bth.*
Sambucus xanthocarpa, *F. Muller.*
Ricinocarpus pinifolius, *Desf.*
Solenogyne bellioides, *Cass.*
Lobelia anceps, *Thunb.*
——— gibbosa, *Labill.*
——— pedunculata. *R. Br.*
Scævola suaveolens, *R. Br.*
Styphelia viridiflora, *R. Br.*
Lissanthe daphnoides, *R. Br.*
Leucopogon Richei, *R. Br.*
—— affinis, *R. Br.*
—— juniperinus, *R. Br.*
—— ericoides, *R. Br.*
Monotoca elliptica, *R. Br.*
Epacris pulchella, *R. Br.*
—— obtusifolia, *Sm.*
—— purpurascens, *R. Br.*
Ponceletia sprengelioides, *R. Br.*
Melichrus, *sp.*
Trochocarpa laurina, *R. Br.*
Myrsine variabilis, *R. Br.*
Villarsia parnassifolia, *Labill.*
Calystegia marginata, *R. Br.*
Prostanthera linearis, *R. Br.*
Conospermum taxifolium, *Sm.*
Persoonia tenuifolia, *R. Br.*
—— virgata, *R. Br.*
—— lanceolata, *Sm.*
Banksia latifolia, *R. Br.*
—— oblongifolia, *Cav.*
—— serrata, *L. Suppl.*
—— integrifolia, *L. Suppl.*
Leptomeria acida, *R. Br.*
Casuarina tenuissima, *Sieb.*
Cryptostylis longifolia, *R. Br.*
Spiranthes Australis, *Labill.*
Pterostylis ophioglossa, mutica, *et* concinna, *R. Br.*
Acianthus fornicatus, *R. Br.*
Corysanthes unguiculata, *R. Br.*
Chiloglottis diphylla, *R. Br.*
Cyrtostylis reniformis, *R. Br.*
Glossodia minor, *R. Br.*
Sowerbæa juncea, *Sm.*
——— sericea, *Sm.*

APPENDIX II.

Systematic Index of the Genera of Plants observed during Mr. Gregory's Expedition in tropical and Eastern subtropical Australia; with the addition of the approximate number of Species either noticed or collected by Dr. Ferd. Müller, *Botanist to the Expedition.*

THALAMIFLORÆ.

Ranunculaceæ.	SP.	
Ranunculus	2	
Clematis	1—	3
Dilleniaceæ.		
Hibbertia	8	
Pleurandra	2	
Hemistemma	3	
Pachynema	1—	14

Anonaceæ.		SP.
Eupomatia		1
Menispermeæ.		
Cocculus	3	
Stephania	1—	4
Nymphæaceæ.		
Nymphæa		2

THALAMIFLORÆ (*continued*).

Nelumbineæ.		SP.
Nelumbium		1
Cabombeæ.		
Brasenia		1
Cruciferæ.		
Cardamine	1	
Nasturtium	1	
Lepidium	1—	3
Capparideæ.		
Capparis	8	
Cleome	3	
Rœpera	1—	12
Violarinæ.		
Ionidium	3	
Viola	2—	5
Droseraceæ.		
Drosera	6	
Byblis	1—	7
Polygaleæ.		
Polygala	4	
Comesperma	4—	8
Tremandreæ.		
Tetratheca		1
Pittosporeæ.		
Pittosporum	5	
Billardiera	1	
Ixiosporum	1	
Hymenosporum	1	
Citriobatus	1	
Bursaria	1—	10
Frankeniaceæ.		
Frankenia		1
Caryophylleæ.		
Polycarpæa	5	
Polycarpon	1—	6
Surianeæ.		
Suriana		1
Phytolacceæ.		
*Phytolacca	1	
Cyclotheca	1—	2

Malvaceæ.		SP.
Malva	2	
Sida	13	
Abutilon	8	
Pavonia	1	
Abelmoschus	2	
Hibiscus	17	
Gossypium	1—	44
Bombaceæ.		
Adansonia	1	
Methorium	3	
Helicteres	1	
Sterculia	1	
Delabechea	1	
Brachychiton	4—	11
Cochlospermeæ.		
Cochlospermum		2
Tiliaceæ.		
Grewia	3	
Triumfetta	6	
Corchorus	6—	15
Buttneriaceæ.		
Seringia	1	
Keraudrenia	2	
Rulingia	2	
Commersonia	1	
Dicarpidium	1	
Waltheria	1	
Melochia	1	
Riedleja	1	
Melhania	1—	11
Elæocarpeæ.		
Elæocarpus		2
Olacinæ.		
Ximenia	1	
Olax	2—	3
Aurantiaceæ.		
Triphasia	1	
Glycosmis	1	
Limonia	1—	3
Hypericinæ.		
Hypericum		1

THALAMIFLORÆ (*continued*).

	SP.	
Elatineæ.		
Elatine	1	
Bergia	3—	4
Guttiferæ.		
Calophyllum		1
Hippocrateæ.		
Hippocratea		1
Erythroxyleæ.		
Erythroxylon		1
Sapindaceæ.		
Dodonæa	9	
Distichostemon	1	
Heterodendron	2	
Nephelium	5	
Cupania	5	
Thouinia	2	
Schmiedelia	1	
Cardiospermum	1	
Apophyllum	1—	27
Meliaceæ.		
Elseya	1	
Azadirachta	1	
Owenia	5	
Hartighsea	3	
Melia	1	
Carapa	1—	12

	SP.	
Ampelideæ.		
Cissus	9—	9
Geraniaceæ.		
Geranium	1	
Erodium	1—	2
Oxalideæ.		
Oxalis		1
Zygophylleæ.		
Zygophyllum	1	
Tribulopsis	3	
Tribulus	3—	7
Rutaceæ.		
Geijera	3	
Euodia	1	
Eriostemon	2	
Zieria	1	
Boronia	8—	15
Xanthoxyleæ.		
Acronychia		3
Simarubeæ.		
Picroxylon		1
Cedreleæ.		
Flindersia	1	
Strzeleckia	1	
Oxleya	1	
Cedrela	1—	4

CALYCIFLORÆ.

Stackhousieæ.		
Stackhousia	3	
Celastrinæ.		
Osteotheca	2	
Catha	4	
Celastrus	2	
Elæodendron	1—	9
Rhamneæ.		
Zizyphus	2	
Colubrina	1	
Alphitonia	1	
Ventilago	1—	5
Anacardiaceæ.		
Buchanania	1	
Leguminosæ.		
Oxylobium	2	
Podolobium	2	
Gompholobium	3	

Leguminosæ (continued).	
Jacksonia	5
Oxycladium	1
Daviesia	2
Phyllota	1
Aotus	1
Dillwynia	1
Euchilus	1
Pultenæa	7
Mirbelia	1
Hovea	4
Platylobium	1
Nematophyllum	1
Bossiæa	5
Crotalaria	12
Westonia	1
Lotus	1

CALYCIFLORÆ (*continued*).

Leguminosæ (continued).	SP.
Indigofera	12
Psoralea	8
Psoralina	3
Tephrosia	6
Wistaria	2
Sesbania	4
Agati	1
Swainsonia	2
Zornia	6
Æschynomene	2
Lourea	1
Dicerma	1
Taverniera	1
Lespedeza	1
Desmodium	7
Tetracommæa	1
Kennedya	1
Hardenbergia	1
Leptocyamus	2
Galactia	1
Canavalia	1
Mucuna	1
Phaseolus	1
Plagiotropis	1
Vigna	3
Erythrina	3
Atylosia	3
Rhynchosia	1
Abrus	1
Dichromosperma	1
Sophora	1
Castanospermum	1
Barklya	1
Microcassia	1
Labichea	1
Petalogyne	2
Brewsteria	1
Cassia	15
Cæsalpinia	1
Bauhinia	3
Laboucheria	1
Neptunia	2
Inga	1
Acacia	50—212

		SP.
Rosaceæ.		
Rubus		3
Chrysobalaneæ.		
Parinarium		2
Combretaceæ.		
Terminalia	9	
Chuncoa	1	
Lumnitzera	1—	11
Alangieæ.		
Pseudalangium		1
Melastomaceæ.		
Melastoma	1	
Osbeckia	1—	2
Rhizophoreæ.		
Ceriops	1	
Rhizophora	1	
Bruguiera	1	
Carallia	1—	4
Onagreæ.		
Epilobium	1	
Jussiæa	2	
Ludwigia	1—	4
Halorageæ.		
Myriophyllum	3	
Haloragis	4—	7
Callitrichinæ.		
Callitriche		1
Ceratophylleæ.		
Ceratophyllum		1
Lythraceæ.		
Lythrum	2	
Calopeplis	1	
Basistemon	1	
Ammannia	3	
Pemphis	1—	8
Myrtaceæ.		
Calycothrix	7	
Lhotzkya	1	
Homalocalyx	1	
Tryptomene	1	
Verticordia	1	

CALYCIFLORÆ (*continued*).

Myrtaceæ (continued).

	SP.	
Darwinia	1	
Astartea	1	
Harmogia	2	
Bæckia	2	
Tristania	4	
Callistemon	3	
Melaleuca	8	
Leptospermum	4	
Lysicarpus	1	
Xanthostemon	2	
Angophora	3	
Eucalyptus	40	
Lithomyrtus	1	
Acmene	2	
Eugenia	3	
Jambosa	2	
Barringtonia	2—	92

Cucurbitaceæ.

Luffa	2	
Cucumis	2	
Cucurbitella	1	
Trichosanthes	3	
Bryonia	1	
Zehneria	1	
Lagenaria	1—	11

Passifloreæ.

Disemma		2

Portulaceæ.

Portulaca	7	
Calandrinia	2	
Trigastrotheca	1	
Mollugo	2	
Trianthema	3	
Brachypyxis	2	
Sesuvium	1	
Glinus	1	
Tetragonia	1—	20

Mesembryanthemeæ.

Mesembryanthemum		1

Crassulaceæ.

Tillæa		1

Cunoniaceæ.

Callicoma		1

Escallonieæ.

		SP.
Hemidistylis		1

Umbelliferæ.

Hydrocotyle	7	
Hemicarpus	3	
Didiscus	1	
Xanthosia	1	
Actinotus	1	
Trachymene	2	
Platycarpidium	1	
Astrotricha	1	
Petroselinum	1	
Helosciadium	1	
Daucus	1	
Eryngium	2—	22

Araliaceæ.

Panax	1	
Sciadophyllum	1—	2

Caprifoliaceæ.

Sambucus		2

Loranthaceæ.

Loranthus	15	
Tupeia	2	
Viscum	1—	18

Rubiaceæ.

Asperula	3	
Pomax	1	
Opercularia	2	
Spermacoce	5	
Cephaelis	1	
Psychotria	4	
Pavetta	3	
Canthium	6	
Pogonolobus	1	
Morinda	2	
Creocarpus	1	
Nertera	1	
Hedyotis	6	
Rondeletia	1	
Gardenia	4	
Guettarda	1—	42

Euphorbiaceæ.

Euphorbia	6	
Excœcaria	1	

CALYCIFLORÆ (*continued*).

Euphorbiaceæ (continued).	SP.	
Omalanthus	2	
Cœlebogyne	1	
Elachocroton	1	
Tragia	1	
Petalostigma	1	
Echinocroton	1	
Acalypha	2	
Amperea	1	
Mappa	1	
Baloghia	1	
Ricinocarpus	1	
Bertya	1	
Adriana	1	
Beyera	1	
Croton	6	
Monococcus	1	
Briedelia	1	
Phyllanthus	7	
Synostemon	4	
Melanthesa	2	
Leptonema	1	
Micranthemum	1	
Glochidion	2	
Elachopetalum	1	
Poranthera	1—	50

Compositæ.		
Vernonia	1	
Eurybia	2	
Vittadinia	2	
Therogeron	1	
Minuria	1	
Calotis	5	
Brachycome	5	
Lagenophora	1	
Solenogyne	1	
Sphæranthus	2	
Conyza	1	
Spiropodium	1	
Blumea	5	
Pluchea	2	
Rhodanthemum	4	
Oliganthemum	1	
Monenteles	3	
Eclipta	1	

Compositæ (continued).		SP.
Siegesbeckia	1	
Wedelia	3	
Wollastonia	3	
Bidens	2	
Diodontium	1	
Spilanthes	2	
Glossogyne	2	
Flaveria	1	
Cotula	1	
Myriogyne	3	
Sphæromorphæa	1	
Soliva	1	
Calocephalus	1	
Pycnosorus	1	
Cassinia	1	
Ozothamnus	1	
Rutidosis	2	
Ixiolæna	1	
Rytidochlamys	1	
Podolepis	3	
Chrysocephalum	1	
Helichrysum	4	
Helipterum	2	
Gnaphalium	3	
Erechthites	2	
Senecio	2	
Coleocoma	1	
Haplotaxis	1	
Kippistia	1	
Leuzea	1	
Picris	1	
*Crepis	1	
Sonchus	2—	93

Stylidieæ.		
Stylidium		16

Lobeliaceæ.		
Lobelia	9	
Pratia	1—	10

Campanulaceæ.		
Wahlenbergia		1

Goodeniaceæ.		
Goodenia	20	
Calogyne	1	

CALYCIFLORÆ (*continued*).

Goodeniaceæ (continued).		SP.
Velleya	4	
Dampiera	2	
Leschenaultia	1	
Scævola	9—	37
Epacrideæ.		
Styphelia	1	
Lissanthe	1	

Epacrideæ (continued).		SP.
Leucopogon	8	
Monotoca	2	
Epacris	3	
Ponceletia	1	
Melichrus	1	
Acrotriche	1	
Trochocarpa	1—	19

COROLLIFLORÆ.

Myrsineæ.		
Myrsine	1	
Ægiceras	1—	2
Sapoteæ.		
Mimusops	1	
Sersalisia	3	
Ixiocarpus	1—	5
Ebenaceæ.		
Diospyros	1	
Maba	4—	5
Oleinæ.		
Olea	1	
Notelæa	3—	4
Jasmineæ.		
Jasminum		6
Loganiaceæ.		
Strychnos	1	
Logania	1	
Dichotomostachys	1	
Mitrasacme	16—	19
Gentianeæ.		
Limnanthemum	4	
Villarsia	1	
Canscora	1	
Erythræa	1—	7
Apocyneæ.		
Parsonsia	6	
Lyonsia	1	
Balfouria	1	
Wrightia	1	
Alstonia	2	
Tabernæmontana	1	
Carissa	2	
Cerbera	1	
Melodinus	1	
Alyxia	1—	17

Asclepiadeæ.		
Microstemma	2	
Cynoctonum	5	
Bidaria	2	
Leichhardtia	1	
Gongronema	2	
Gymnema	1	
Marsdenia	4	
Tylophora	2	
Oxystelma	1	
Gymnanthera	1	
Hoya	1	
Sarcostemma	1	
Rhyncharrhena	1—	24
Bignoniaceæ.		
Tecoma	3	
Spathodea	2—	5
Hydrophylleæ.		
Hydrolea		1
Convolvulaceæ.		
Calystegia	1	
Convolvulus	2	
Ipomœa	17	
Breweria	3	
Polymeria	2	
Evolvulus	1	
Cressa	1	
Dichondra	1	
Cuscuta	1—	29
Boragineæ.		
Heliotropium	9	
Lobophyllum	1	
Cynoglossum	3	
Trichodesma	3	
Tournefortia	2	
Halgania	1	
Ehretia	1—	20

COROLLIFLORÆ (*continued*).

Solaneæ.	SP.	
Solanum	25	
Physalis	2	
Nicotiana	1	
Datura	1—	29

Scrophularinæ.		
Duboisia	1	
Büchneria	2	
Vandellia	3	
Bonnaya	3	
Mimulus	3	
Microcarpæa	1	
Limnophila	1	
Gratiola	2	
Centranthera	1	
Veronica	1	
Morgania	2	
Peplidium	1	
Herpestis	1	
Rhamphicarpa	1	
Stemodia	2	
Scoparia	1	
Artanema	1—	27

Acanthaceæ.		
Stemodiopsis	1	
Adenosma	1	
Ruellia	1	
Eranthemum	1	
Rostellularia	2	
Adhatoda	1	
Hygrophila	1	
Dicliptera	1	
Hypoestes	2	
Nelsonia	1—	12

Lentibulariæ.		
Utricularia		8

Primulaceæ.		SP.
Micropyxis		I

Pedalinæ.		
Josephinia		2

Myoporinæ.		
Myoporum	5	
Pholidia	3	
Stenochilus	3	
Eremophila	3—	14

Verbenaceæ.		
Avicennia	2	
Clerodendron	5	
Vitex	5	
Premna	2	
Pityrodia	1	
Newcastelia	1	
Dennisonia	1	
Callicarpa	3	
Teucridium	1	
Verbena	3	
Lippia	1—	25

Labiatæ.		
Lycopus	1	
Salvia	1	
Westringia	1	
Ajuga	1	
Anisomeles	3	
Teucrium	3	
Mentha	3	
Plectranthus	6	
Prostanthera	1—	20

Plumbagineæ.		
Plumbago	1	
Ægialitis	1—	2

Plantagineæ.		
Plantago		1

MONOCHLAMYDEÆ.

Nyctagineæ.		
Boerhaavia		1

Amaranthaceæ.		
Alternanthera	3	
Trichinium	8	
Gomphrena	5	

Amaranthaceæ (continued).		
Ptilotus	3	
Nyssanthes	2	
Amaranthus	3	
Achyranthes	1	
Deeringia	1—	26

MONOCHLAMYDEÆ (*continued*).

Salsoleæ.	SP.	
Blitum	2	
Rhagodia	3	
Chenopodium	3	
Atriplex	4	
Anisacantha	3	
Kentropsis	1	
Kochia	3	
Enchylæna	1	
Salsola	1	
Chenopodina	1	
Arthrocnemum	1	
Halocnemum	2—	25

Polygoneæ.		
Muehlenbeckia	1	
Polygonum	9	
Rumex	3—	13

Laurineæ.		
Cryptocarya	1	
Tetranthera	2	
Cassytha	2	
Gyrocarpus	1—	6

Proteaceæ.		
Conospermum	1	
Helicia	1	
Persoonia	5	
Orites?	1	
Grevillea	22	
Hakea	7	
Lomatia	1	
Stenocarpus	2	
Banksia	5—	45

Thymeleæ.	SP.	
Wickstrœmia	1	
Pimelea	9—	10

Santalaceæ.		
Anthobolus	2	
Santalum	1	
Exocarpus	2	
Leptomeria	1	
Thesium	1—	7

Urticeæ.		
Aphananthus	1	
Urtica	2	
Parietaria	1	
Morus	2	
Dorstenia	1	
Ficus	12—	19

Casuarineæ.		
Casuarina		6

Coniferæ.		
Frenela	4	
Podocarpus	1	
Araucaria	2—	7

Ephedreæ.		
Ephedra		1

Cycadeæ.		
Macrozamia	1	
Cycas	2—	3

Piperaceæ.		
Piperomia		2

MONOCOTYLEDONEÆ.

Orchideæ.		
Calanthe	1	
Spiranthes	1	
Microtis	1	
Dipodium	2	
Cryptostylis	1	
Cymbidium	3	
Dendrobium	3	
Sarcochilus	1	
Pterostylis	6	
Caladenia	2	

Orchideæ (continued).		
Acianthus	1	
Corysanthes	1	
Chiloglottis	1	
Arthrochilus	1	
Cyrtostylis	1	
Glossodia	1	
Oberonia	1—	28

Philydreæ.		
Philydrum		1

MONOCOTYLEDONEÆ (*continued*).

Irideæ.		SP.
Patersonia		2
Amaryllideæ.		
Calostemma	1	
Crinum	3—	4
Scitamineæ.		
Hellenia		1
Hydrocharideæ.		
Anacharis	1	
Hydrocharis	1	
Ottelia	2	
Vallisneria	2—	6
Najadeæ.		
Najas		2
Zosteraceæ.		
Thalassia		2
Alismaceæ.		
Alisma		2
Juncagineæ.		
Cycnogeton	2	
Ouvirandra	2	
Aponogeton	1	
Potamogeton	4	
Ruppia	1	
Leiostigma	1	
Triglochin	1—	12
Hæmodoraceæ.		
Hæmodorum		3
Dioscoreæ.		
Dioscorea		1
Smilacinæ.		
Smilax	1	
Ripogonum	1—	2
Melanthaceæ.		
Anguillaria	1	
Kreysigia	1—	2
Pontederiaceæ.		
Limnostachys		1
Liliaceæ.		
Bulbine	2	
Dichopogon	1	

Liliaceæ (continued).		SP.
Chlorophytum	1	
Cæsia	3	
Tricoryne	1	
Dianella	3	
Cordyline	1	
Asparagus	1	
Eustrephus	2	
Geitonoplesium	2	
Thysanotus	2	
Sowerbæa	1	
Xanthorrhœa	2—	22
Hypoxideæ.		
Hypoxis		1
Aphyllantheæ.		
Laxmannia		1
Commelyneæ.		
Commelyna	4	
Aneilema	5	
Cyanotis	1	
Cartonema	1—	11
Taccaceæ.		
Tacca		1
Aroideæ.		
Arum	1	
Typhonium	1	
Caladium	1—	3
Orontiaceæ.		
Gymnostachys	1	
Pothos	1—	2
Pistiaceæ.		
Lemna		1
Typhaceæ.		
Typha	1	
Sparganium	1—	2
Pandaneæ.		
Pandanus		3
Palmæ.		
Livistona	2	
Seaforthia	1	
Calamus	1—	4

MONOCOTYLEDONEÆ (*continued*).

		sp.
Xyrideæ.		
Xyris		5
Eriocauleæ.		
Eriocaulon		4
Desvauxieæ.		
Desvauxia		2
Xerotideæ.		
Xerotes		4
Flagellarieæ.		
Flagellaria		1
Junceæ.		
Juncus		5
Restiaceæ.		
Restio	3	
Lepyrodia	1	
Calorophus	1—	5
Cyperoideæ.		
Cyperus	14	
Kyllingia	1	
Hypælyptum	1	
Fuirena	2	
Chondrachne	1	
Chorizandra	1	
Isolepis	5	
Scirpus	4	
Heleocharis	6	
Fimbristylis	24	
Rhynchospora	1	
Schœnus	3	
Chætospora	1	
Lepidosperma	2	
Cladium	5	
Gahnia	1	
Psittacoschœnus	1	
Caustis	1	
Scleria	2	
Carex	6—	82
Gramineæ.		
Sporobolus	2	
Cinna	1	

Gramineæ (continued).	sp.	
Agrostis	1	
Perotis	1	
Aristida	4	
Stipa	1	
Amphipogon	1	
Danthonia	1	
Bromus	1	
Glyceria	1	
Vulpia	1	
Poa	2	
Eragrostis	3	
Triodia	3	
Phragmites	1	
Eriachne	5	
Pappophorum	2	
Triraphis	2	
Ectrosia	2	
Dactyloctenium	1	
Chloris	3	
Cynodon	2	
Paspalum	1	
Panicum	25	
Oplismenus	1	
Setaria	3	
Cenchrus	2	
Lappago	1	
Neurachne	1	
Isachne	1	
Xerochloa	2	
Spinifex	2	
Anthistiria	6	
Andropogon	16	
Erianthus	2	
Imperata	1	
Ischæmum	4	
Rottboellia	3	
Ophiurus	1	
Hemarthria	1	
Zoysia	1	
Microlæna	1	
Oryza	1	
Leersia	1—	118

ACOTYLEDONEÆ.

Polypodiaceæ.	SP.	
Acrostichum	2	
Platycerium	2	
Campyloneuron	1	
Gymnogramme	1	
Notochlæna	2	
Polypodium	7	
Cheilanthes	2	
Adiantum	2	
Pteris	5	
Blechnum	1	
Lomaria	1	
Asplenium	4	
Doodia	2	
Nephrodium	4	
Aspidium	1	
Lindsæa	1	
Davallia	1	
Dicksonia	2	
Ceratopteris	1	
Polypodiaceæ (continued).	SP.	
Gleichenia	4	
Platyzoma	1	
Schizæa	1	
Lygodium	1—	49
Lycopodiaceæ.		
Psilotum	1	
Tmesipteris	1	
Lycopodium	5—	7
Marsileaceæ.		
Marsilea	1	
Azolla	1—	2
Ophioglosseæ.		
Ophioglossum	3	
Botrychium	1—	4
Characeæ.		
Chara	3	
Nitella	3—	6

Præcursores ad Floram Indicam. By J. D. HOOKER, Esq., M.D., F.R.S. & L.S., and T. THOMSON, Esq., M.D., F.R.S. & L.S.

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Nat. Ord. CAPRIFOLIACEÆ.

BESIDES the many well-known points of close affinity between *Caprifoliaceæ* and *Rubiaceæ*, an examination of the Indian plants of the former Order enables us to add one which has generally been supposed to present a good distinguishing character between them, namely the large stipules present in two genuine species of *Lonicera* itself. In *Sambucus* the leaves are sometimes described as stipulate, an appearance due in the Indian species to a pair of reduced basal pinnules.

The structure of the ovules in this Order is similar in many respects to that of *Corneæ*, and is the same as in many *Rubiaceæ*. These, in the very earliest stage of *Viburnum Tinus*, consist of a minute mamillary curved nucleus encircled with an annulus, which is the only integument; this annulus is no further developed, but as the ovule grows to maturity, it continues unchanged at its apex. The fully-developed ovule hence has no apparent integuments; that represented by the annulus, being the one which answers to the inner (secundine) in more highly-developed ovules, is in *Viburnum*, congenitally adnate with the nucleus. In *Viburnum* the ovary is generally 1-celled, in *V. Tinus* 2-celled, and the solitary pendulous ovule hangs transversely, so that the raphe is neither turned towards the placental axis, nor diametrically away from it. The testa is formed of the walls of the nucleus and its adherent integument. The cavity of the ovary is full of stellate hairs. The three stigmas are free in a very early stage, and the ovule is developed in one of them above the plane passing through the base of the calyx-lobes. The three stigmas hence probably represent as many free ovaries which afterwards combine, and the developed cells are produced downwards forming cavities in the peduncle.

(Conspectus Generum.)

A. **LONICEREÆ.** Corollæ *tubus elongatus*. Stylus *filiformis*. Rhaphe *extrorsa*.

1. **LONICERA,** *Desf.* *Calycis* limbus 5-dentatus. *Corolla* tubulosa. *Stamina* 5. *Ovarium* 2–3-loculare; ovulis plurimis, pendulis. *Bacca* carnosa, oligo- v. poly-sperma, 2–3-locularis, v. septis obliteratis 1-locularis.—Frutices *v.* suffruticuli *erecti v. scandentes*; foliis *in paucis stipulatis*.

2. **LEYCESTERIA,** *Wall.* *Calycis* limbus 5-lobus, lobis linearibus. *Corolla* infundibuliformis. *Stamina* 5. *Ovarium* 5-loculare; ovulis perplurimis, pendulis. *Bacca* carnosa, 5-locularis, polysperma.—Frutex *erectus*; caule *ramoso, fistuloso*; foliis junioribus *sæpe lobatis*; floribus *bracteatis*; bracteis *amplis*.

3. **TRIOSTEUM,** *L.* *Calycis* limbus 5-lobus, lobis foliaceis. *Corolla* tubulosa. *Stamina* 5. *Ovarium* 3–5-loculare; ovulis solitariis pendulis. *Bacca* coriacea.—Suffruticuli; foliis *basi subconnatis connatisve*.

4. **ABELIA,** *Br.* *Calycis* tubus compressus; limbus 5-partitus, lobis foliaceis. *Corolla* infundibuliformis. *Stamina* 4. *Ovarium* 3-loculare; loculis duobus pluri-ovulatis, ovulis abortientibus; tertio 1-ovulato fertili. *Bacca* coriacea, 1-sperma.—Frutices *debiles*; foliis *crenatis*; floribus *involucratis*.

5. **DICHILANTHE,** *Thwaites.* *Calycis* limbus breviter tubulosus, intus 5-squamatus, 5-partitus. *Corolla* infundibuliformis, curva, ore bilabiato, labio superiore 2-dentato, inferiore 3-dentato. *Stamina* 5. *Ovarium* 2-loculare; ovulis solitariis, pendulis.—Arbor; ramulis *teretibus, ad nodos gemmiferis*; foliis *lanceolatis, coriaceis, integerrimis*; floribus *terminalibus, sessilibus, confertis*.

B. Sambuceæ. Corolla *rotata v. breviter tubulosa.* Stigmata 3, *sessilia.* Rhaphe *introrsa v. lateralis.*

6. Viburnum, *L.* *Calycis* limbus parvus, 5-dentatus. *Corolla* rotata v. breviter infundibuliformis v. tubulosa. *Stamina* 5. *Ovarium* 1-, rarius 2–3-loculare; ovulis solitariis, pendulis. *Bacca* abortu 1-locularis, 1-sperma.—Frutices *erecti*; foliis *simplicibus, integris*; floribus *corymbosis.*

7. Sambucus, *Tourn.* *Calycis* limbus 5-dentatus v. obsoletus. *Corolla* rotata. *Stamina* 5. *Ovarium* 3–5-loculare; ovulis solitariis, pendulis. *Bacca* 3–5-pyrena.—Suffrutices *v.* Herbæ; foliis *impari-pinnatisectis, basi spurie 2-stipulatis v. 2-glandulosis*; floribus *corymbosis.*

I. Lonicera, *L.*

§ A. Stipulatæ. *Stipulæ* interpetiolares magnæ.

1. **Lonicera stipulata** (*Hf. & T.*). Ramis foliis stipulisque subtus inflorescentiaque dense lanuginosis, stipulis orbiculatis reflexis, foliis distichis oblique ovato-lanceolatis subserratis, floribus subcapitatis, capitulis axillaribus pedunculatis, baccis polyspermis,

Hab. In Himalaya orientali temperata. Sikkim! alt. 6000–10,000 ped., *J. D. H.* (fl. Mart. Apr.) (v. v.)

Species insignis. *Folia* 4–6 unc. longa, coriacea, supra læte viridia, subrugosa, basi inæqualia. *Stipulæ* ½ unc. latæ, marginibus recurvis. *Flores* erecti, bracteati. *Calycis* lobi lineari-oblongi. *Corolla* ⅝ unc. longa, alba, infundibuliformis, basi subgibbosa, laxe lanata. *Stamina* inclusa. *Bacca* ovoidea, flava.

2. **Lonicera glaucophylla** (*Hf. & T.*). Glaberrima, ramis gracilibus, foliis distichis breve petiolatis lanceolatis v. ovato-lanceolatis acuminatis sinuato-serratis subtus glaucis puberulis, stipulis orbiculatis reflexis.

Hab. Himalaya orientali temperata. Sikkim! alt. 5000-6000 ped., *J. D. H.* (v. v.)

Folia 3-4 unc. longa, submembranacea; nervis subtus gracilibus. *Flores* ignoti.

§ B. Bracteatæ. Erectæ. *Pedunculi* 2-flori. *Bracteæ* 2, magnæ, membranaceæ v. foliaceæ, orbiculatæ, flores amplectentes.

3. **Lonicera hispida** (*Pall. ex Willd. MSS.*). Ramis hispido-pilosis, foliis oblongis lineari- v. ovato-oblongis obtusis acutis acuminatisve ciliatis utrinque sparse pilosis, pedunculis robustis deflexis, bracteis amplis membranaceis ciliatis flores fere velantibus, corolla infundibuliformi breviter 5-loba.—*D.C. Prodr.* iii. 338; *Ledeb. Flor. Ross.* ii. 389. *Ic.* t. 212.—*L. bracteata*, Royle, Ill. p. 237. t. 53.

Var. β. *setosa*; ramulis foliisque utrinque setoso-hispidis, foliis basi subcordatis.

Hab. Himalaya alpina interiore, alt. 11,000–14,000 ped. Kunawur! *Munro.* Garwhal! et Kumaon! *Strachey & Winterbottom.* Sikkim! *J. D. H.*—Var. β. Sikkim, alt. 13,000 ped., *J. D. H.* (fl. Jul.) (v. v.)

Distr. Soongaria; Siberia Altaica.

Frutex robustus, 2–4-pedalis. *Rami* paucifoliati, cortice laxo; ramulis interdum flexuosis. *Folia* breve petiolata, 1–2 unc. longa, submembranacea. *Pedunculi* pilosi, foliis breviores. *Bracteæ* (majores quam in stirpe Sibirica) ½–1 unc. longæ, valde concavæ, acutæ, ciliatæ, pubescentes, subplicatæ. *Flores* supra medium exserti, glabri v. pilosi. *Corolla* late tubuloso-infundibuliformis, basi gibba. *Bracteolæ* minimæ. *Fructus* ovoideus; seminibus plurimis, singula serie sub 8.

4. Lonicera glauca (*Hf. & T.*). Fruticulus ramosus glaber, foliis (½–⅔ pollicaribus) lineari-oblongis obtusis marginibus scaberulis recurvis subtus glaucis, pedunculis brevibus, bracteis late ovato-oblongis ciliatis, corolla longe tubulosa tubo gracili, ovariis liberis.

Hab. In Himalaya interiore occidentali et Tibetia alpina, alt. 13,000–16,000 ped. Kumaon! et Garwhal! *Strachey & Winterbottom.* Zanskar! Piti! Nubra! *T. Thomson.* (fl. Jul.) (v. v.)

Fruticulus humilis. *Rami* glauci, virgati, cortice laxo. *Flores* foliis æquilongi. *Corolla* bracteis duplo longior, glabra v. pilosula. *Bracteæ* basi connatæ v. liberæ, ½ unc. longæ; bracteolis inconspicuis. *Baccæ* globosæ, seminibus majusculis.

5. Lonicera asperifolia (*Hf. & T.*). Frutex ramosus, ramulis puberulis, foliis ovato-oblongis cordatisve subacutis ciliatis superne glabratis subtus glaucis pubescentibusque marginibus tenuiter recurvis et demum crispatulis, pedunculis brevissimis, bracteis late oblongis obtusis, corolla longe tubulosa, ovariis liberis.—*Xylosteum asperifolium,* Decaisne in Plant. Jacquem. 77. t. 85.

Hab. In Himalaya et Tibetia occidentali temperata et subalpina, alt. 10,000–14,000 ped. Gugi! *Strachey & Winterbottom.* Kunawur, *Jacquemont.* Zanskar! et Kashmir! *T. Thomson.* (fl. Jun. Jul.) (v. v.)

L. glaucæ affinis, sed omnibus partibus major, et foliis latioribus subtus pubescentibus. *Ramuli* interdum sparse setosi. *Folia* juniora basi rotundata, seniora latiora, basi cordata; *petioli* graciles, ¼ unc. longi. *Corollæ* pilosæ tubus lobis triplo longior. *Bracteolæ* 0. *Baccæ* ovoideæ; seminibus paucis magnis.

§ C. Erectæ. *Pedunculi* 2-flori. *Bracteæ* setaceæ v. foliaceæ, flores non amplectentes.

† Corollæ *limbus non-bilabiatus.* Bracteolæ *magnæ, plerumque connatæ et ovaria cingentes (in* L. obovata *parvæ).*

6. Lonicera ligustrina (*Wall. in Roxb. Fl. Ind.* ii. 179). Arbuscula, ramulis pubescentibus, foliis lanceolatis obtuse acuminatis mar-

ginibus costaque ciliolatis glaberrimisve, pedunculis brevibus, bracteis setaceis, ovariis liberis bracteolis connatis semicinctis, corollæ tubo gracili supra basin gibboso.—*D.C. Prodr.* iv. 334; *Wight, Ill.* iii. 1025.

Hab. Himalaya centrali subtropica. Nipal, alt. 4000 ped.! *Wallich.* Montibus Khasia, alt. 4000–6000 ped.! *Simons,* &c. Montibus Nilgherrie, *Wight,* &c. (fl. Mart. Apr.) (v. v.)

Arbuscula 10–15-pedalis, foliosa. *Folia* breve petiolata, 1–3 unc. longa, venosa, plana, subnitida. *Pedunculi* $\frac{1}{10}$–$\frac{1}{3}$ unc. longi, pubescentes. *Corolla* $\frac{1}{2}$ unc. longa, glabra v. pilosa. *Bacca* globosa; seminibus 2–4, magnis.

7. **LONICERA TOMENTELLA** (*Hf. & T.*). Ramulis foliis subtus pedunculisque tomentosis, foliis ($\frac{3}{4}$–1 poll.) lineari-oblongis lanceolatisve obtusis acutisve, pedunculis breviusculis, bracteis foliaceis lineari-oblongis, bracteolis in cupulam connatis, ovariis glaberrimis ovoideis, calycis limbo brevi lobis obtusis, corolla basi subæquali pilosula, genitalibus inclusis.

Hab. Himalaya orientali temperata. Sikkim, alt. 8000–12,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Frutex 10–12-pedalis; ramulis distichis, strictis. *Folia* opaca. *Bracteæ* $\frac{1}{4}$–$\frac{3}{4}$ unc. longæ. *Ovaria* libera v. connata. *Corolla* alba, vix $\frac{1}{2}$ unc. longa, ore æquali, lobis brevibus, fauce villosa. *Baccæ* atræ, magnit. pisi; seminibus parvis, numerosissimis.

8. **LONICERA SERICEA** (*Royle, Herb.*). Ramulis novellis foliisque subtus præcipue sericeis, foliis (1–1$\frac{1}{2}$ poll.) lineari-obovatis oblongo-lanceolatisve obtusis, axillis nervorum subtus tomentellis, pedunculis gracilibus, bracteis linearibus, bracteolis in cupulam connatis, calycis limbo cupulari truncato, corolla pubescenti-pilosa basi gibba breviter 5-loba ore æquali.

Hab. Himalaya temperata. Kumaon?! *Hb. Royle.* Sikkim, alt. 11,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Arbuscula gracilis, ramulis strictis demum glabris. *Folia* sublonge petiolata. *Pedunculi* fructus filiformes, glabri. *Flores* sericei. *Ovaria* glabra, distincta v. connata. *Baccæ* parvæ, atræ. *Semina* numerosa, oblonga.—Descriptio ex exemplaribus floriferis Royleanis, et fructiferis Sikkimensibus in quibus bracteolæ delapsæ sunt (an nullæ?).

9. **LONICERA ANGUSTIFOLIA** (*Wall. Cat.* no. 480). Glaberrima v. foliis ramulisque junioribus pilosulis, foliis (pollicaribus) lanceolatis oblongo-lanceolatisve acutis acuminatisve subtus pallidis, pedunculis gracilibus, bracteis linearibus foliaceisve, bracteolis in cupulam connatis, corolla basi æquali glabra breviter 5-fida ore æquali fauce villosa.—*D.C. Prodr.* iv. 337; *Journ. Hort. Soc. Lond.* iii. 238.

Hab. Himalaya temperata, a Sikkim! alt. 10,000–12,000 ped., *J. D. H.*, ad Kashmir! 6000–10,000 ped., *T. T.* (fl. Mai. Jun.) (v. v).

Frutex 6–12-pedalis; ramulis gracilibus. *Folia* seniora utrinque glaberrima, latitudine varia, plerumque lanceolata, interdum oblongo- v.

obovato-lanceolata. *Pedunculi* ½–1 unc. longi. *Bracteæ* sæpissime foliaceæ, ¼–⅓ unc. longæ. *Ovaria* sæpius bracteolis immersa. *Calycis* lobi obtusiusculi. *Corolla* vix ½ unc. longa, alba v. pallide rosea, odora. *Bacca* magnit. pisi. *Semina* pauca, 1–6.

10. **Lonicera rupicola** (*Hf. & T.*). Rigida, ramulis puberulis, foliis (½–¾ poll.) lineari-oblongis subacutis marginibus recurvis subtus niveo-tomentosis, pedunculis brevibus, bracteis linearibus foliaceis subtus albo-tomentosis, bracteolis discretis ovaria subæquantibus, calycis lobis elongatis pilosis, corolla glabrata basi æquali, genitalibus inclusis.

Hab. In Tibetia orientali et centrali alpina. Gugi, alt. 13,500 ped.! *Strachey & Winterbottom*, et in Tibetia Sikkimensi, alt. 15,000–17,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Fruticulus rigidus, 2–4-pedalis. *Folia* coriacea, supra reticulatim venulosa. *Flores* ½ unc. longi. *Calycis* lobi lanceolati, in tubum brevem connati. *Corollæ* tubus subcylindricus, ore æquali, lobis patentibus lineari-oblongis.

11. **Lonicera spinosa** (*Jacquem. MSS.*). Glaberrima, rigida, ramis lignosis, ramulis spinescentibus, foliis lineari-oblongis marginibus obtusis recurvis, pedunculis brevissimis, bracteis foliaceis linearibus marginibus recurvis, bracteolis in cupulam connatis, calycis limbo cupulari lobis ovatis acutis, corollæ tubo gracili basi æquali lobis inæqualibus, genitalibus exsertis.—*L. linearis*, Hb. Royle.—*Xylosteum spinosum*, Decaisne, Plant. Jacquem. 78. t. 86.

Hab. In Himalaya interiore alpina et temperata. Kunawur, 11,000–12,000 ped.! *Jacquemont*; *T. T.* Garwhal, 11,500 ped.! *Strachey & Winterbottom*. In Tibetia occidentali, alt. 12,000–15,000 ped.! *T. T.*, et orientali, alt. 15,000–17,000 ped.! *J. D. H.* (fl. Jul.) (v. v.)

Fruticulus rigidus, totus glaberrimus, cortice pallido v. albo. *Folia* sparsa, parva, coriacea. *Flores* ramulis abbreviatis aggregati, pro planta magni. *Corolla* ½–¾ unc. longa, tubo quam in affinibus longiore et graciliore.

12. **Lonicera Myrtillus** (*Hf. & T.*). Ramulis puberulis, foliis (⅓–½ poll.) elliptico- v. obovato-oblongis obtusis subtus glaucis, pedunculis brevissimis elongatisve, bracteis foliaceis lineari-oblongis, bracteolis in cupulam connatis, corolla campanulata basi æquali, lobis brevibus subæqualibus fauce pilosa, genitalibus inclusis.

Hab. Himalaya temperata et alpina. Marri, 9000 ped.! *Fleming.* Kishtwar, 8000–12,000 ped.! *T. Thomson.* Kunawur! *Lance.* Sikkim, 11,000–14,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Fruticulus parvus, sæpius depressus, ramis prostratis. *Folia* breve petiolata, glaberrima, basi acuta, supra luride viridia. *Flores* breves. *Corolla* latiuscula, sub ⅓ unc. longa. *Baccæ* parvæ; semina pauca, sub 4.

13. *Lonicera parvifolia* Edgew. in Wall. Cat. 9058, non Bunge; Edgew. in Linn. Trans. xx. p. 60.

Hab. In Himalaya temperata et alpina. Kunawur, alt. 11,000–13,000 ped.! *T. T.* Kumaon, alt. 12,000 ped.! *Blinkworth, Strachey & Winterbottom.* Sikkim, alt. 12,000–14,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Omnia sicut *L. Myrtillus* nisi bracteæ latiores et foliaceæ.

14. LONICERA PURPURASCENS (*Hf. & T.*). Ramulis pubescentibus, foliis ovatis oblongisve obtusis basi rotundatis truncatisve utrinque pubescentibus, pedunculis gracilibus folio brevioribus, bracteis linearibus arcuatis ciliatis tenuissime glandulosis, bracteolis rotundis connatis submembranaceis glabris, calyce cyathiformi brevissimo subintegro marginibus reflexis, corolla basi gibba puberula ore æquali breviter 5-fido.—*Xylosteum purpurascens,* Jacquem. MSS.; Decaisne in Plant. Jacquem. 79. t. 87.

Hab. Himalaya occidentali temperata. Kashmir, *Jacquemont.* (fl. Jun.)

L. parvifoliæ affine, differt foliis majoribus, corolla pilosa, bacca 4-sperma, et calyce pateræformi reflexa.

15. *Lonicera obovata* (Herb. Royle).

Hab. Himalaya occidentali temperata et subalpina. Kishtwar! et Kunawur! alt. 8000–13,000 ped., *T. T.* Kumaon, alt. 12,500 ped.! *Strachey & Winterbottom.* Sikkim, alt. 11,000–14,000 ped.! *J. D. H.* (fl. Jun.) (v. v.)

Omnia *L. parvifoliæ,* sed bracteæ lineari-subulatæ, bracteolæ parvæ, corollæ tubus gracilior basi valde gibbosus, et genitalia exserta. Ab *L. microphylla* differt forma corollæ, et bracteolis parvis.

†† Corolla *bilabiata.*

a. Bracteolæ magnæ plerumque connatæ.

16. LONICERA QUINQUE-LOCULARIS (*Hardwick in As. Res.* vi. 351; *Wall. in Roxb. Fl. Ind.* ii. 174). Ramulis puberulis, foliis (1–2 poll.) oblongis ellipticis ovato-cordatisve puberulis, pedunculis brevissimis, bracteis minimis setaceis, bracteolis in cupulam ciliatam connatis, corollis pubescenti-pilosis basi æqualibus profunde bilabiatis labio superiore breviter 4-lobo inferiore lineari-oblongo.—*L. diversifolia,* Wall. in Roxb. Flor. Ind. ii. 178; Hook. Ic. Plant. t. 807; Lindley in Bot. Reg. xxx. t. 33.—*L. Royleana,* Wall. Cat. 478.

Hab. In Himalaya occidentali temperata, alt. 5000–11,000 ped. A Kumaon! *Blinkworth,* ad Kashmir! *T. Thomson.* Necnon in Bhotan! *Griffith.* (fl. Jun.) (v. v.)

L. incanæ, Decaisne (*persica,* Jaub. & Sp. et? *L. Kurdistana,* Boiss.) proxima, differt solummodo bracteolis cupulæformibus.

Folia et *ramuli* plus minusve pubescentes v. subvelutini. *Folia* utrinque acuta v. obtusa v. basi interdum cordata, seniora interdum remote sinuato-dentata. *Calycis* limbus cupularis, 5-fidus. *Ovaria* plerumque libera. *Filamenta* pilosa. *Baccæ* magnit. pisi, sessiles, quaternæ. *Semina* 8–10, atra.

17. LONICERA HYPOLEUCA (*Decaisne, Plant. Jacquem.* 81. t. 89). Ramulis pubescenti-pilosis glandulosisve, foliis ($\frac{2}{3}$–1$\frac{1}{3}$ poll.) oblongis cordato-rotundatisve obtusis puberulis subtus glaucis, pedunculis $\frac{1}{3}$–$\frac{1}{2}$ unc. longis, bracteis subfoliaceis lineari-oblongis, bracteolis glanduloso-hispidulis in cupulam connatis, corollis glanduloso-pilosis basi gibbis ad medium bilabiatis.—Cf. *L. aurea* (Aucher-Eloi, 4340), quæ differt ramulis glabris.

Hab. Himalaya occidentali temperata, alt. 8000–10,000 ped. Kunawur et Piti! *Jacquemont*, &c. Garwhal! *Strachey & Winterbottom.* (fl. Jun.) (v. v.)

Fruticulus depressus. *Folia* breve petiolata. *Pedunculi* stricti. *Bracteæ* sub $\frac{1}{4}$ unc. longæ. *Ovaria* plerumque in unum connata. *Calycis* lobi parvi. *Corolla* sub $\frac{1}{2}$ unc. longa. *Filamenta* glabra. *Baccæ* parvæ, bracteolis semi-immersæ.

18. LONICERA DECIPIENS (*Hf. & T.*). Ramulis gracilibus, foliis (1$\frac{1}{2}$–2-pollicaribus) ovatis oblongisve acuminatis membranaceis glabris, pedunculis elongatis puberulis, bracteis minimis setaceis, bracteolis orbiculatis ovaria discreta æquantibus, corolla bilabiata basi gibba breviter campanulata, stylo hirsuto.

Hab. In Himalaya orientali temperata. Sikkim, alt. 10,000–12,000 ped.! *J.D.H.* (fl. Jul.) (v. v.)

L. Tataricæ, L. valde affinis et simillima; differt bracteolis magnis, calycisque dentibus brevioribus.—*Frutex* 10–15-pedalis. *Flores* glabrati, vix $\frac{1}{2}$ unc. longi. *Corollæ* faux pilosa. *Stylus* villosus. *Baccæ* diametr. pisi, rubræ demum nigræ. *Semina* sub 8.

β. *Bracteolæ* parvæ v. nullæ (vid. *L. obovata* in subsectione priore).

19. LONICERA ORIENTALIS (*Lam. Dict.* i. 731). Tota glaberrima, foliis membranaceis (2–4 poll.) ovatis ellipticis ovato-lanceolatisve acuminatis nervis tenuibus, pedunculis gracilibus, bracteis parvis subulatis setaceisve, bracteolis minimis orbiculatis, corolla brevi basi subgibba profunde bilabiata, filamentis styloque sericeis.—*D.C. Prodr.* iv. 337; *Jaub. & Spach, Illust.* t. 71.—L. Govaniana, *Wall. Cat.* No. 481; *D.C. Prodr.* iv. 337.

Hab. Himalaya occidentali temperata, alt. 6000–10,000 ped.; a Kumaon! *Blinkworth*, ad Kashmir! *T. Thomson.* (fl. Jun.) (v. v.)

Distr. Caucasus, Iberia.

Frutex gracilis, omnino glaber, nisi secus nervos foliorum subtus, filamenta stylusque. *Petioli* subgraciles. *Pedunculi* $\frac{1}{2}$–1 poll. longi. *Ovaria* sæpissime in fructum pyriformem connata. *Calycis* lobi subulati. *Corolla* $\frac{1}{3}$ unc. longa. *Baccæ* nigræ.

20. LONICERA HETEROPHYLLA (*Decaisne, Plant. Jacquem.* 30. t. 38). Ramulis glaberrimis, foliis obovatis v. elliptico-lanceolatis acutis acuminatisve basi attenuatis integris sinuato-lobatisve ciliatis, petiolis tenuissime glandulosis, pedunculis elongatis folio brevioribus, bracteis

lineari-subulatis, bracteolis minimis, calycis limbo obsoleto, corolla hispidula bilabiata basi gibba.

Hab. Himalaya occidentali temperata; Kunawar ad Choupienne, alt. 6000–7000 ped., *Jacquemont*. (fl. Jun.)

Proxime affinis videtur *L. orientali*, et verosimiliter varietas.

21. LONICERA MICROPHYLLA (*Willd. in Rœm. & Sch. Syst.* v. 258). Glaberrima v. pilosula, foliis plerumque in ramulos breves fasciculatis (⅔–1 poll.) obovatis oblongisve obtusis, pedunculis gracilibus, bracteis setaceis, bracteolis 0, calycis limbo truncato, corolla glaberrima tubo gracili basi gibbo supra medium dilatato bilabiato.—*D.C. Prodr.* iv. 336; *Led. Flor. Ross.* n. 213.

Hab. In Tibetia occidentali temperata; alt. 11,000–14,000 ped.! *T. Thomson*. (fl. Jun.) (v. v.)

Distr. Altai, Soongaria.

Fruticulus parvus, habitu *L. parvifoliæ*. *Folia* forma varia, plerumque obovata, rarius lineari-oblonga, subtus pallida sed vix glauca. *Pedunculi* ½–1 unc. longi. *Corolla* ½ unc. longa. *Filamenta* glabra. *Ovaria* discreta v. connata. *Baccæ* parvæ; seminibus sub 6.

22. LONICERA DISCOLOR (*Lindl. in Bot. Reg.* 1844, sub t. 33, et vol. xxxiii. 1847, t. 44). Glaberrima, foliis (1½–2 poll.) late oblongis ellipticisve obtusis membranaceis nervis tenuibus, junioribus acutis sparse puberulis, pedunculis gracilibus, bracteis setaceis, bracteolis minimis, calycis limbo cupulari truncato, corolla brevi pilosa basi lata gibba infra medium bilabiata.

Hab. Himalaya occidentali temperata, alt. 9000–10,000 ped. Kashmir! et Kishtwar! *T. Thomson*. (fl. Jun.) (v. v.)

L. orientali simillima, sed calycis lobi fere obsoleti corollaque brevior pilosa.

23. LONICERA ALPIGENA (*L. Sp. Pl.*). Sparse glanduloso-pilosula, foliis (2–4 poll.) ovato-lanceolatis attenuato-acuminatis membranaceis basi rotundatis cordatisve, pedunculis elongatis pilosis, bracteis parvis subulatis, bracteolis minimis ovatis, calycis limbo breviter lobato, corolla basi gibba glanduloso-pubescenti bilabiata labio superiore breviter lobato, stylo sericeo.—*L. Webbiana*, Wall. Cat. No. 476; D.C. Prodr. iv. 336.—*L. oxyphylla*, Edgew. in Linn. Trans. xx. p. 60.

Hab. Himalaya temperata, alt. 8000–10;000 ped., a Kumaon! *Blinkworth, Strachey & Winterbottom*, ad Marri! *Fleming*, et in Bhotan! *Griffith*. (fl. Jun.) (v. v.)

Distr. Alpibus Europæ centralis.

Affinis *L. orientali*, sed glanduloso-pubescens, foliis majoribus, longe acuminatis, corollisque glandulosis. A *L. discolor* differt foliis.

§ D. SCANDENTES. *Corolla* bilabiata.

24. LONICERA JAPONICA (*Thunb. Jap.* 89, *fid. Wall. Cat.* 473). Ramulis petiolis pedunculisque patentim pilosis, foliis breve petiolatis

ovato-lanceolatis acuminatis basi cordatis ciliatis subtus crebre reticulatim venosis tomentosis, floribus axillaribus solitariis v. ramulis axillaribus capitatis v. in spicas terminales dispositis, bracteis brevibus bracteolisque parvis ciliatis, ovario glabro, corolla longissima (1½ poll.) hirsuta.—*Wall. in Roxb. Fl. Ind.* ii. 174; *And. Bot. Rep.* ix. 583 (*fid. Wall.*); *Bot. Reg.* i. t. 70.—*L. macrantha,* D.C. Prodr. iv. 333.—*Caprifolium macranthum,* Don, Prodr. 140.—*L. confusa,* D.C. *l. c.*—*L. hirtiflora,* Champion.

Hab. Himalaya centrali et orientali, alt. 6000–9000 ped. Nipal! *Wallich.* Sikkim! *J. D. H.* Mont. Khasia! *Griffith, Masters.* (fl. Mai.) (v. v.)

Distr. Japan; China!

Var. *β.* Ramis gracilioribus, foliis subtus glaucis, floribus brevioribus.

Hab. Montibus Khasia, alt. 5000–6000 ped.! *Da Mack*; *J. D. H. & T. T.* (fl. Jun.) (v. v.)

Rami robusti, ramuli stricti. *Folia* 2–3 unc. longa, coriacea, supra glabra, subtus pallidiora interdum velutina. *Flores* flavi, vix odori.

Obs. *L. longiflora,* D.C. Prodr. iv. 331, *Caprifol. longiflorum,* Sabine MSS. in Lindl. Bot. Reg. t. 1232 (Nepaliæ incola?), est glaberrima, et verosimiliter planta Chinensis.

25. **Lonicera glabrata** (*Wall. Cat.* 474, *et in Roxb. Fl. Ind.* ii. 175). Ramulis glabris pubescentibusve, foliis ovato-cordatis ovato-oblongisve acuminatis subtus glabris puberulisve, floribus versus apices ramulorum axillarium breviter racemosis, bracteis brevissimis subulatis, bracteolis minimis, corolla (½ poll.) glaberrima tubo infundibuliformi.—*D.C. Prodr.* iv. 334.—*L. ovata,* Herb. Ham. Wall. Cat. 6300.

Var. *β.* Ramulis foliisque oblongo-lanceolatis subtus tomentosis.

Hab. Himalaya centrali et orientali temperata, alt. 5000–7000 ped. Nepal! *Wallich.* Sikkim! *J. D. H.* Assam (Montibus Khasia?), *Masters.* (fl. Oct.-Dec.) (v. v.)—Var. *β.* Bhotan! *Griffith.*

L. Japonicæ affinis, differt foliis non ciliatis, plerumque latioribus et subtus glaberrimis, ramulis non patentim pilosis, calyce breviore, et corolla multo minore tubo breviore glaberrima.

26. **Lonicera Loureirii** (*D.C. Prodr.* iv. 334). Ramulis pubescentibus junioribus hirsutis villosisve, foliis oblongo-lanceolatis longe acuminatis basi rotundatis cordatisve ciliatis subtus pubescenti-pilosis glabratisve, pedunculis robustis axillaribus et ad apices ramulorum fasciculatis bifloris, bracteis linearibus elongatis interdum foliaceis, corollæ (½ poll.) pilosæ tubo infundibuliformi lobis breviusculis.—*Hook. Ic. Plant.* 806 (est forma foliis brevioribus).—*L. acuminata,* Wall. Cat. 472, et in Roxb. Fl. Ind. ii. 176; D.C. Prodr. iv. 334.—*Xylosteum Loureirii,* Bl. Bijd. 653.

Hab. Himalaya centrali et orientali, alt. 7000–11,000 ped. Nepal! *Wallich*; *J. D. H.* Sikkim! *J. D. H.* (fl. Aug.-Oct.) (v. v.)

Distr. Java.

Planta variabilis, præcipue indumento; ab affinibus (sequente excepto) distinguitur bracteis fructu æquilongis v. longioribus interdum foliaceis.

27. LONICERA LESCHENAULTII (*Wall. Cat. No.* 471, *et in Roxb. Fl. Ind.* ii. 178). Tota nisi in pagina superiore foliorum cano-pubescens v. cano-tomentosa, foliis ovato-cordatis ovatisve acuminatis, pedunculis axillaribus v. in fasciculos racemosve terminales dispositis, ovariis canis, bracteis linearibus, corollæ tubo (1-1½ poll.) gracili.—*Wight, Ill.* ii. 72. t. 120 et 121 B; *Wight & Arn. Prodr.* 389.—*L. mollis,* Wight, Ill. ii. 71; Wall. Cat. 6301.

Hab. Montibus Malabariæ, alt. 5000-7000 ped. frequens! *Leschenault,* &c. (fl. Jan.-Mar.)

Facile distinguitur foliis latis, pube v. tomento cano, ovariis canis, bracteis elongatis, tuboque corollæ gracili.

28. LONICERA GRIFFITHII (*Hf. & T.*). Glaberrima, foliis gracile petiolatis ovatis oblongis orbiculatisve obtusis, floribus in capitula terminalia dispositis, pedunculis calycibus bracteisque parvis pilosis, corolla (⅔ poll.) glanduloso-pilosa tubo infundibuliformi.

Hab. Affghanistan! *Griffith.*

L. Etruscæ proxima, differt foliis supremis non connatis.—*Folia* 1-1½ unc. longa, interdum fere latiora quam longa, in eodem ramulo forma varia, inferiora angustiora, suprema interdum cordata. *Calyx* longe ciliatus.

Quid *Lonicera,* Affghanistan, Griff. 751? (folia tantum).

L. lanceolata, Wall. in Roxb. Fl. Ind. ii. 177; D.C.? et Wall. Cat. No. 475; in Herb. Linn. Soc. (ubi corolla deest); D.C. Prodr. iv. 334?

L. bicolor, Kl. in Prinz Waldem. Him. 71 (fid. Pritzel, Icon. Bot.)?

L. macrogyne, Kl. in Prinz Waldem. Him. 72?

II. LEYCESTERIA, *Wall.*

1. *Leycesteria formosa,* Wall. in Roxb. Flor. Ind. ii. 181. Cat. No. 470; D.C. Prodr. iv. 338; Wight, Ill. ii. 72. t. 121 D.

Hab. Himalaya temperata, alt. 5000-10,000 ped. frequens; a Simla! *Comta. Dalhousie,* ad Sikkim! *J. D. H.,* et Montibus Khasia, alt. 5000-6000 ped., *J. D. H. & T. T.* (fl. Jun.-Aug.) (v. v.)

Rami fistulosi. *Petioli* basi mediante linea elevata crassa stipulari juncti. *Folia* juniora sæpissime lobata, et serrata. *Bacca* septis interdum ab axi solutis. *Gemmæ* foliiferæ iis *Loniceræ* omnino similes.—Genus vix a *Lonicera* distinctum.

III. TRIOSTEUM, *L.*

1. *Triosteum Himalayanum,* Wall. in Roxb. Fl. Ind. ii. 180; D.C. Prodr. iv. 330.

Hab. Himalaya temperata, alt. 10,000-12,000 ped. Kumaon! *Strachey & Winterbottom.* Nipal! *Wallich.* Sikkim! *J. D. H.* (fl. Jul.-Sept.) (v. v.)

Quid *T. hirsutum,* Roxb. Fl. Ind. ii. 180. e Chittagong?

IV. ABELIA, *Br.*

1. *Abelia triflora* (Br. in Wall. Plant. As. Rar. 14. t. 15; D.C. Prodr. iv. 339; Wight, Ill. ii. 72. t. 121 C.
Hab. Himalaya occidentali temperata, alt. 6000–9000 ped.; a Kumaon! *Blinkworth,* ad Marri! *Fleming.* (fl. Jun.–Aug.) (v. v.)

V. DICHILANTHE, *Thw.*

1. *Dichilanthe Zeylanica,* Thwaites in Hook. Kew Journ. Bot. vol. viii. 270 & 376. t. 8 A. (ubi stipulæ delendæ).
Hab. Sylvis tropicis insulæ Ceylon! *Thwaites.*

VI. VIBURNUM, *L.*

A. *Corolla* breviter campanulata, v. infundibuliformis.

1. **VIBURNUM COTINIFOLIUM** (*Don, Prodr.* 141). **Foliis ovatis rotundatisve subintegerrimis subtus albis corymboque subsessili dense stellato-tomentosis, calycis lobis brevissimis.**—*D.C. Prodr.* iv. 327; *Wight, Ill.* 72. t. 121 A; *Lindl. Bot. Reg.* xix. t. 1650.—*V. polycarpum,* Wall. Cat. 455; D.C. Prodr. iv. 328.

Var. *α*. Foliis utrinque subvelutino-tomentosis.
Var. *β*. Foliis superne glabris.
Var. *γ*. Foliis ovato-oblongis oblongo-lanceolatisve.

Hab. Himalaya temperata, alt. 7000–9000 ped. Bhotan! *Griffith.* Kumaon! *Blinkworth,* &c. Simla! *Comta. Dalhousie,* &c. (fl. Jun. Jul.) (v. v.)

Ramuli robusti, ad apices tantum foliosi. *Folia* breve crasse petiolata, 3–5 poll. longa, acuta v. obtusa, reticulatim venosa, opaca, integerrima v. crenulata, basi rotundata v. cordata. *Corymbi* rami crassi, ramosi. *Ovarium* glaberrimum. *Bacca* oblonga, $\frac{1}{3}$ unc. longa; endocarpio compresso, utrinque 2-sulcato; stylo brevissimo conico.

B. *Corolla* rotata. *Corymbus* subumbellatus.

2. **VIBURNUM CORYLIFOLIUM** (*Hf. & T.*). **Ramulis petiolis corymbisque breve pedunculatis patentim stellatim tomentosis subvillosisve, foliis late ovato-cordatis acuminatis grosse dentatis utrinque molliter pubescentibus, corymbi radiis elongatis.**

Hab. Montibus Khasia, regione temperata, prope Kala-panee, alt. 5000–6000 ped.! *J. D. H. & T. T.* (frt. Jun.) (v. v.)

Distr. ? China.

Frutex. *Folia* 2 poll. longa, submembranacea, seniora superne glabrata, nervis parallelis, petiolis brevibus v. elongatis. *Flores* non visi. *Baccæ* parvæ, late ovatæ, acutæ, nitidæ, utrinque sulcatæ, valde compressæ, hinc concavæ.

3. **VIBURNUM STELLULATUM** (*Wall. Cat.* 463). **Foliis ovatis ovato-cordatis lanceolatisve caudato-acuminatis grosse sinuato-dentatis, supra glabris subtus secus nervos sparse stellatim puberulis pilosulisque,**

corymbo subsessili decomposito alabastrisque cinereo-pubescentibus. —*D.C. Prodr.* iv. 327; *Wall. Plant. As. Rar.* ii. p. 54. t. 169.—*V. Mullaha*, Ham. in Don, Prodr. 141; D.C. *l. c.*

Hab. In Himalaya centrali et occidentali temperata, alt. 7000–10,000 ped. Nepal! *Wallich.* Kumaon! et Garwhal! *Blinkworth*; *Strachey & Winterbottom.* Simla! *Madden*, &c. (fl. Jul. Aug.) (v. v.)

Ramuli cinerei. *Folia* 3–6 unc. longa, submembranacea, basi cuneata, rotundata v. cordata, supra medium dentata; costa subtus sæpius appresse pilosula. *Corymbus* multiradiatus; flores minimi. *Ovaria* dense pubescentia. *Calycis* lobi oblongi. *Corolla* rotata, extus pubescens. *Stamina* brevia. *Stylus* brevis, subcolumnaris, stigmate capitato. *Bacca* ovato-oblonga, valde compressa, magnitudine varia ($\frac{1}{4}$–$\frac{1}{2}$ unc. longa), nitida; endocarpio longitudinaliter hinc uni-, inde bi-sulcato.

4. *Viburnum involucratum* (Wall. Cat. 458; D.C. Prodr. iv. 327).

Hab. In Himalaya temperata tota, alt. 7000–11,000 ped., frequens a Sikkim! *J. D. H.*, ad Jamu! *T. T.* (fl. Mai.–Jun.) (v. v.)

Omnia *V. stellulati* (cujus verosimiliter varietas est), sed ramis gracilioribus, foliis minoribus interdum fere glaberrimis, corymbisque laxioribus.—Forma a cl. Wallichio lecta cum corymbo foliato certe monstrosa est; in Sikkim haud infrequens.

5. **VIBURNUM CORDIFOLIUM** (*Wall. Cat.* 462). Foliis ovato-cordatis acuminatis creberrime argute dentatis, nervis subtus petiolis pedunculisque sparse stellato-puberulis, corymbis sessilibus bracteatis radiis elongatis, ovariis glabris.—*D.C. Prodr.* iv. 327.—*V. furcatum*, Bl. in Herb. Hook.

Hab. In Himalaya temperata, alt. 10,000-12,000 ped. Bhotan! *Griffith.* Sikkim! *J. D. H.* Nepal! *Wallich.* Kumaon! *Blinkworth.* (fl. Mai.–Jun.) (v. v.)

Distr. Japan!

Frutex v. arbuscula. *Rami* teretes, glabri. *Folia* terminalia, submembranacea, 3–5 poll. longa, nervis plurimis subparallelis, juniora subtus stellato-tomentosa. *Corymbi* radii interdum bracteolati. *Calycis* lobi stellatim pilosi. *Corolla* late rotata. *Stamina* parva. *Stylus* late conicus. *Stigma* 3-lobum. *Bacca* late ovata, endocarpio utrinque medio sulcato.

6. **VIBURNUM FŒTIDUM** (*Wall. Cat.* 466; *Plant. As. Rar.* i. p. 49. t. 61). Ramulis petiolis corymbis nervis foliorum subtus pube stellata furfuraceis, foliis elliptico-oblongis basi cuneatis trinerviis grosse sinuato-dentatis serratisve, corymbis pedunculatis, ovariis glabris.—*D.C. Prodr.* iv. 325.

Var. *β. premnacea*, corymbo foliis 3–4 involucrato.—*V. premnaceum*, Wall. Cat. 461; D.C. Prodr. *l. c.*

Hab. Montibus Khasia regione tropica, alt. 3000–5000 ped.! *De Silva*, &c.; Montibus Taong dong Birmæ! *Wallich.* (fl. Jun.) (v. v.)

Frutex 6–10-pedalis. *Rami* foliosi. *Folia* 1–4 unc. longa, obtusa, acuta v. acuminata, interdum integerrima, nervis paucis, ad axillas sæpius tomentellis. *Corymbi* compositi, non ampli, ebracteati v. foliis 1–4 involucrati. *Flores* parvi, bracteolati. *Calycis* lobi late ovati. *Corolla* rotata, tubo brevi. *Stylus* brevis, late conicus. *Bacca* ovata, acuta, nitida, $\frac{1}{4}$ unc. longa, forma *V. mollis*.

7. VIBURNUM LUTESCENS (*Blume, Bijd.* 655). Petiolis corymbisque spurie axillaribus pedunculatis pube stellulata furfuraceis, foliis oblongis ellipticisve crebre grosse serrato-dentatis utrinque glabris, ovariis glaberrimis.—*D.C. Prodr.* iv. 324.—*V. Colebrookianum*, Wall. Cat. 460; D.C. *l. c.*—(*V. Sundaicum*, Miq.)

Hab. In Himalaya orientali tropica. Sikkim, alt. 2000–4000 ped.! *J. D. H.* Assam! Silhet! et Montibus Khasia! alt. 0–4000 ped. frequens! *De Silva*, &c. (fl. Mart. Apr.) (v. v.)

Distr. Insulis Malayanis.

Frutex 6–8-pedalis. *Rami* robusti, foliosi. *Folia* submembranacea, 4–7 poll. longa, nervis subtus interdum sparse puberulis. *Corymbi* longe pedunculati, spurie axillares, *i. e.* in ramulis axillaribus brevissimis inconspicuis terminales. *Flores* parvi, ebracteolati. *Calycis* lobi oblongi, concavi. *Corolla* rotata. *Stamina* brevia. *Baccæ* parvæ, rubræ; endocarpio compresso, utrinque convexo, obscure sulcato.—Ramuli floriferi in exemplaribus Malayanis plerumque evoluti sunt; corymbique dein terminales evadunt.

8. VIBURNUM PUNCTATUM (*Ham. in Don Prodr.* 142). Glaberrimum v. corymbo terminali puberulo, foliis coriaceis ellipticis elliptico-lanceolatisve acuminatis subtus punctulatis, corymbi ramis angulatis floribusque bracteatis, ovariis glaberrimis.—*D.C. Prodr.* iv. 324.—*V. acuminatum*, Wall. Cat. 465; D.C. *l. c.*; Wight & Arn. Prodr. 388; Wight, Icon. t. 1021; Spicileg. t. 89.

Hab. In Himalaya tropica, alt. 1000–5000 ped., a Bhotan! *Griffith*, ad Kumaon! *Strachey & Winterbottom*. Montibus Concan! et Canaræ! *Stocks*, &c., et Malabariæ! *Noton*, &c. (fl. Jan.-Mart.) (v. v.)

Distr. Java.

Frutex orgyalis. *Rami* robusti. *Folia* utrinque acuminata, nervis paucis, subtus subtilissime punctulata. *Corymbus* amplus. *Flores* parvi. *Calycis* lobi oblongi. *Corolla* rotata. *Bacca* majuscula, $\frac{1}{3}$ unc. longa, oblonga, utrinque obtusa, compressa; endocarpio utrinque bisulcato.

9. VIBURNUM INTEGERRIMUM (*Wall. Cat.* 457). Foliis glaberrimis elliptico-oblongis integerrimis abrupte caudato-acuminatis paucinerviis, corymbo terminali pedunculato stellatim pubescente.—(Valde affine *V. sambucino*, Blume.)

Hab. Insula Penang! *Wallich*; *Walker*. (fl. Aug.)

Distr. Java.

V. punctato affine, differt foliis subtus impunctatis, corymbi pedunculo ramisque dense pubescentibus gracilioribus.—*Ramuli* et petioli juniores puberuli. *Flores* parvi.

C. *Corolla* rotata. *Corymbus* paniculatus v. thyrsiformis.

10. VIBURNUM ODORATISSIMUM (*Ker, Bot. Reg.* vi. t. 456). Glaberrimum, foliis coriaceis elliptico-ovatis obovatis lanceolatisve acuminatis integerrimis serratisve, petiolis crassis, corymbo glaberrimo terminali paniculato pedunculato ramis crassis brachiatis paucifloris.—*V. Irabutha,* Blume MSS. in Herb. Hook.

Hab. In Montibus Khasia regione tropica; alt. 4000 ped.! *Griffith, Masters,* &c. (fl. Nov.) (v. v.)

Distr. China! Japan!

Frutex 6–10 pedalis. *Rami* robusti. *Folia* 4–6 unc. longa, valde coriacea, utrinque lævia, latitudine varia. *Corymbus* pyramidatus, 3–4-pollicaris, ramis patentibus, decussatis, crassis, angulatis. *Ovarium* glaberrimum. *Calycis* limbus cupularis, dilatatus, vix lobatus. *Corolla* parva, rotata. *Bacca* ovoidea, tumida; endocarpio sectione transversa reniformi-rotundato; seminis sectione cyclica.

11. VIBURNUM SIMONSII (*Hf. & T.*). Foliis glaberrimis ovato- v. elliptico-lanceolatis acuminatis supra medium serratis nervis numerosis parallelis, corymbo terminali longe pedunculato pubescente, ramulis floribusque bracteolatis.

Hab. In regionibus temperatis Montium Khasia, alt. 5000–7000 ped.! *Simons,* &c. (fl. Jun.) (v. v.)

Frutex v. arbuscula 8–15 ped., fœtens. *Folia* suberecta, 2–4 poll. longa, coriacea, utrinque lævia, viridia, petiolis rubris, nervis validis. *Corymbus* floridus subcontractus, fructifer glabratus, conicus, brachiatus, ramis angulatis decussatis sæpius rubris; bracteolis subulatis. *Ovarium* glabrum. *Calycis* lobi ovati, obtusi. *Corolla* parva. *Stylus* conicus; stigmate late capitato. *Bacca* oblonga, ¼ unc. longa; endocarpio sectione transversa late reniformi, sinu lato subquadrato.

D. *Corolla* tubo elongato cylindrico; limbo patente.

12. VIBURNUM ERUBESCENS (*Wall. Cat.* 459 & 7474). Foliis ovatis ovato-cordatis lanceolatisve acuminatis supra medium dentato-serratis nervis numerosis, corymbis paniculatis terminalibus lateralibusque nutantibus longe pedunculatis ramis bracteolatis.—*D.C. Prodr.* iv. 329.

Var. *α.* Foliis elliptico-oblongis acuminatis utrinque glaberrimis v. subtus pilosulis, paniculis glabratis.—*V. erubescens,* Wall. Cat. *l. c.*; Plant. As. Rar. ii. p. 29. t. 134.

Var. *β.* Foliis late ovato-cordatis acuminatis subtus pilis albis sparsis, paniculis glabris puberulisve.

Var. *γ.* Foliis late oblongis obtusis acutisve subtus pilosulis, paniculis puberulis.—*V. Wightianum,* Wall. Cat. 3729; Plant. As. Rar. ii. p. 29; Wt. & Arn. Prodr. 388; Wt. Ic. 1024, Spicil. t. 90.

Var. *δ.* Ramulis petiolis costis foliorum paniculisque dense stellatim tomentosis, foliis oblongo- v. elliptico-lanceolatis acuminatis, subtus ad nervos præcipue pubescentibus, pedunculo paniculæ crasso, ramis brevibus.

Var. ε. Foliis parvis (pollicaribus) late oblongis obtusis subtus paniculisque parvis pubescentibus.

Hab. Montibus Himalayæ temperatæ, alt. 5000–11,000 ped., a Bhotan! *Griffith*, ad Kumaon! *Blinkworth*; et Montibus Malabariæ, *Wight*, &c.; et Ceyloniæ, alt. 4000–5000 ped., *Gardner*, &c.—Var. *a*. in Nepal, Ceylon, Malabar, et Sikkim; var. *β*. Kumaon et Sikkim; var. *γ*. Malabar; var. δ. Sikkim, alt. 10,000 ped.; var. ε. Bhotan. (fl. Mart.–Mai.) (v. v.)

Species valde variabilis forma folii et indumento, sed habitu characteribusque certis facile recognoscenda.—Arbor parva, ramis sæpius gracilibus, foliis 1–4 poll. paniculisque pendulis nutantibusve operta. *Folia* utrinque viridia, nervis numerosis, axillis interdum barbatis. *Paniculæ* 1–4 unc. longæ, pedunculo gracili (in var. δ. robusto), pauci- v. multifloræ. *Flores* ½ unc. longi, ovario glaberrimo. *Calycis* lobi ovati, obtusi. *Corolla* tubo lobis ter longior, alba, straminea v. pallide rosea. *Bacca* parva, ovato-oblonga, endocarpio sectione transversa sublunato, sinu quadrato lato.

13. VIBURNUM NERVOSUM (*Don, Prodr.* 141). Foliis ellipticis oblongis lanceolatisve acuminatis serrulatis subtus petiolisque pubescenti-pilosis nervis numerosis parallelis, floribus præfoliaceis, corymbis brevibus sessilibus terminalibus erectis densifloris, bracteis tomentosis.—*D.C. Prodr.* iv. 327.—*V. grandiflorum*, Wall. Cat.

Valde affinis *V. fragrans*, Bunge, e China.

Hab. In Himalaya temperata et subalpina. Kumaon, alt. 10,000–12,000 ped.! *Blinkworth*, &c. Nepal! *Wallich*. Sikkim, alt. 11,000–13,000 ped, *J. D. H.* (fl. Mai.) (v. v.)

Frutex 3–6 pedalis, ramis robustis apice tantum foliiferis. *Folia* 3–4½ poll. longa, axillis nervorum sæpe barbatis. *Flores* albi v. rosei, odori, ¾ unc. longi, breve pedicellati, pedicellis ramisque inflorescentiæ robustis erectis patentim pilosis. *Corymbi* primum bracteis sericeo-tomentosis late ovatis tecti, ramis floribusque bracteolatis, bracteolis linearibus membranaceis. *Ovarium* glabrum. *Calycis* lobi breves, oblongi, obtusi. *Corollæ* tubus limbo quater longior. *Bacca* ⅓ unc. longa, oblonga, utrinque obtusa, compressa, endocarpio sectione transversa semicylindraceo; seminis sectione cyclico.

14. VIBURNUM FŒTENS (*Decaisne in Plant. Jacquem.* 75. t. 84). Foliis oblongis elliptico-lanceolatisve acuminatis serratis, glaberrimis puberulisve floribus præfoliaceis, corymbis terminalibus sessilibus glabris bracteolatis.

Hab. In Himalaya occidentali temperata, alt. 6000–10,000 ped. Kishtwar! Chamba! Kashmir! Marri! *Jacquemont, Fleming, T. T.* (fl. Mai. Jun.) (v. v.)

Omnia *V. nervosi,* sed paniculis foliis petiolisque fere glaberrimis, et inflorescentiæ ramis laxis v. effusis. *Flores* fœtidi (fid. *Jacquem.*). *Baccæ* ut in *V. nervoso* sed longiores, $\frac{3}{4}$ unc. longæ.

E. *Corolla* tubulosa, brevis, cylindrica, limbo non explanato.

15. VIBURNUM CORIACEUM (*Bl. Bijd.*). Foliis glaberrimis oblongis et oblongo-lanceolatis longe acuminatis integerrimis subtus pallidis glanduloso-punctulatis, corymbo terminali pedunculato glanduloso-puberulo, ovario verrucoso, corolla glabra.

Var. *α.* Foliis elongatis (4–6 poll.), nervis utrinque 3–5 margine subparallelis.—*V. cylindricum,* Ham. in Don Prodr. 142.

Var. *β.* Foliis elongatis (4–6 poll.), nervis utrinque costæ 4–8 divergentibus.—*V. Zeylanicum,* Gardner.

Var. *γ.* Foliis brevioribus (2–4 poll.), nervis utrinque costæ 3–7 margine subparallelis, corollis interdum puberulis.—*V. capitellatum,* Wight & Arn. Prodr. 1022.

Hab. Var. *α.* In Himalaya temperata, alt. 4000–7000 ped., a Sikkim! *J. D. H.,* ad Simla! *T. T.*; Montibus Khasia, alt. 5000–7000 ped.! *Lobb,* &c.—Var. *β.* Insula Ceylon! alt. 6000 ped., *Walker,* &c.—Var. *γ.* Montibus Malabariæ! *Wight,* &c. (fl. Nov.-Mai.) (v. v.)

Distr. Java!

Arbuscula 15–20 pedalis. *Folia* longitudine varia, plerumque integerrima, juniora interdum sinuato-dentata, coriacea, supra læte viridia, subtus subglauca, axillis nervorum interdum barbatis, basi rotundata, subcordata v. angustata. *Corymbi* subumbellati, multiflori, ramis ebracteolatis crassiusculis patentibus. *Flores* $\frac{1}{4}$ unc. longi. *Calycis* limbus breviter 5-lobus. *Corolla* lobis brevibus, obtusis, erectis; staminibus longe exsertis. *Baccæ* parvæ, $\frac{1}{4}$ unc. longæ, elliptico-oblongæ, compressæ; endocarpio hinc longitudinaliter 1-sulcato, illinc 2-sulcato.

16. VIBURNUM HEBANTHUM (*Wight & Arn. Prodr.* 388). Foliis glaberrimis elliptico-oblongis lanceolatisve acutis obscure dentatis, corymbo pedunculato terminali glabrato pedicellis bracteolatis floribusque dense glanduloso-pubescentibus.—*Wight, Ic.* 1023.—*V. pubigerum,* Wight & Arn. Prodr. 389?—An var. *V. coriacei?*

Hab. Montibus Malabariæ! *Wight,* &c. (fl. Mart.)

V. cylindrico simillimum, differt foliis obtusioribus subtus non aut vix punctatis puberulisve, pedicellis bracteolatis ovariis, corollisque dense pubescentibus.

VII. SAMBUCUS, *L.*

1. SAMBUCUS EBULUS (*Linn. Sp. Pl.* 385; *D.C. Prodr.* iv. 322). Herbacea, ramis sulcatis, stipulis sepius foliaceis, cyma obconica apice planiuscula.

Hab. In Himalaya occidentali temperata, alt. 6000–10,000 ped. Kishtwar! et Kashmir! *T. Thomson.* (fl. Apr.-Jun.) (v. v.)

Distr. Europa tota! Africa borealis! Caucasus! Asia Minor! Persia! Bacca interdum duplex et 6-pyrena.

2. Sambucus Javanica (*Reinw. in Blume, Bijd.* 657). Suffruticosa, ramis teretiusculis, stipulis rarius foliatis, cyma basi foliosa ramis patentibus elongatis, baccis nigris.—*D.C. Prodr.* iv. 322.

Hab. In Himalaya orientali subtropica, alt. 3000–6000 ped. Sikkim! *J. D. H.* In Montibus Khasia, alt. 4000–5000 ped.! Assam! *Masters*; *J. D. H. & T. T.* (fl. Jul. Aug.) (v. v.)

Distr. Java! China!

Foliola interdum 8–9 poll. longa, basi sessili adnata, v. petiolata, cuneata v. cordata.

3. Sambucus adnata (*Wall. Cat.* 482; *D.C. Prodr.* iv. 322). Suffruticosa, ramis sulcatis, stipulis rarius foliatis, cyma basi foliata ramis breviusculis, baccis rubris.

Hab. In Himalaya centrali et orientali temperata, alt. 6000–11,000 ped. Nepal! *Wallich.* Sikkim! *J. D. H.* (fl. Jun. Jul.) (v. v.)

Extract of a Letter from Mr. George Barter to R. Bentley, Esq., F.L.S. Communicated by Professor Bentley.

[Read February 4th, 1858.]

River Kworra, Sept. 29, 1857.

We have been now about three months in the river, laying down its course, sounding, surveying creeks and confluents, and making short journeys overland wherever the nature of the country or its inhabitants permitted. This place, Rabba, is the limit of former explorations, hence ours may be said only to commence from here; in the meantime another large confluent to the Kworra has been discovered, but for several reasons not explored beyond three days' steaming up it. The intended overland journey to Soccatoo will be delayed till the rains cease, but the steamer will be pushed up this river as far as it proves navigable, if the rocks at Boussa, reported to be an obstacle to further progress, can be passed; then perhaps Timbuctoo itself may be reached by Christmas.

In botany I perhaps have made some additions, to the river flora more especially; altogether my numbered list now amounts to 1300 specimens, collected on the coast and in the river, besides various specimens of woods, fruits, &c.; but in a small, overcrowded steamer like this, where half of us have not even a cabin to sleep in, you will imagine many obstacles to plant-preserving: damp below, violent rains and wind-tornadoes on deck,

destroy sometimes the work of weeks: we have not on board a tinned box, or indeed anything to make a water-tight case to put dried plants in.

In the lower parts of the river, till some distance beyond Abo, a rich vegetation is prevalent: Oil and Wine Palms abound; lofty forest trees, for the most part unknown to me, grow together so thickly at their summit, that the light is almost shut out below; trees overhanging the water were observed in this moist region covered with *Orchideæ*, principally of the genera *Angræcum* and *Bolbophyllum*; Ferns, as epiphytes, are also abundant. *Platycerium Stemaria* is on every tree. We however passed so quickly through these parts, that I had few opportunities of landing, therefore did little botanizing. Further up, where the country becomes picturesque, with hills and low mountains, these extensive forests disappear, and the air is drier; the Wine Palm is replaced by the Fan Palm; Oil Palms are still abundant, but less luxuriant; the huge *Bombax* with its laminated trunk gives place to the unsightly *Baobab*. The low mountains have all flat tops, seldom over 2000 feet high, therefore yielding few novelties; the sides of these are frequently bare, composed of sandstone or coarse iron conglomerate. The land from eighty miles below the confluence, to Rabba, whereever we have penetrated any distance, is of a sandy character mixed with iron, therefore not fertile; but it appears to be the true region of *Bassia Parkii*, or the Butter-tree, which occupies extensive tracts; it is a low scrubby tree, seldom more than 15 or 20 feet high, producing its long leaves on the extremities of the branches: the quantity of the butter offered us for sale would have filled a large ship. On some mountains lately visited on the Kworra I have gathered plants resembling the Cape vegetation, viz. *Proteas*, *Aloes*, *Lobelias*, *Brachystelma*, *Ixias*, *Nycterinias*, &c. I anticipate much novelty should we reach any of greater elevation. A low belt of ground always borders the river; in general this is swampy, covered with tall grasses, among which a beautiful *Gynerium* is now in flower; it seems identical with the *G. argenteum* of our gardens at home.

To the Palms of Africa I have at least added four undescribed species: one like *Geonoma*, the others *Calami*; probably many of the latter yet exist in the delta. I am not sure if the Fan Palm is known by specimens: near the river it is scattered along singly, generally at intervals one or two miles apart; only once have we seen them gregarious, on some mountains up the Kworra twelve miles from the confluence: it does not form a large head; the leaf-petioles are short; the trunk sometimes 60 feet high, always of greatest diameter in the middle; so conspicuous is this, that it destroys all pretensions to beauty. The Oil Palm, which I believe is somewhere so figured, never approaches this form,—a small stem tapering from the base being universal with *Elæis*. On the disputed point—the sexes of *Elæis*,—the evidence gathered confirms the truth of Brown's statement: *both sexes occur on one tree*, although in most plants the sexes are on different trees: the plant producing *male flowers only*, is the one alone pierced for making wine. Plants having reputed medicinal properties are so common in use among the natives that I have ceased to pay much attention to them; nearly all which grow round their towns are used for some amazing virtue. A species of *Balanophorea*, *Thonningia sanguinea*, which I was requested to look after by Dr. Hooker, appears useful in dysentery, being used by several nations: it is a rare plant, but frequently seen exposed for sale in the markets; I have met with it but once, growing on the roots of a *Bauhinia*, its fine crimson flowers just appearing above the sand. Among many interesting fruits gathered is a species of gigantic Bread-fruit,—an *Artocarpus*, mentioned by Dr. Vogel as growing about the confluence; it is a large tree, 60 to 80 feet high, with smooth whitish bark yielding a milky juice, leaves ovate acuminate, shining and coriaceous: the fruit of this is said to weigh sometimes 30 lbs.; specimens which I have preserved are over 17 lbs., though many larger ones could have been obtained, had space allowed; seeds of this are about the size of small kidney beans, and form an important article of food to the natives; in the woods near the Model Farm this tree is most abundant. On one occasion, when botanizing there after rain, the sun shone out fiercely, loosening the hold of these fruits: the sound of their fall, as they crashed through the branches, was continuous throughout the afternoon, like the passing of large animals. Several kinds of *Anonas* and *Artabotrys* abound: the fruit of one of these is almost equal in flavour to an English apricot. Ferns have become very rare now, and epiphytic Orchids not any. Aquatic plants are not numerous. *Nymphæa dentata*, *Ceratopteris thalictroides*, *Pistia Stratiotes*, *Salvinia*, a species of floating plant* (the latter is very beautiful, and will, if I can bring it home, be an interesting addition to the aquarium), *Chara*, sp., and two kinds of *Utricularia*, are forms of much interest. Several *Cyperaceæ*, a *Polygonum*, *Alisma sagittifolium*, *Jussiæa*, sp., with some other *Onagraceæ*, occupy most of the swampy lagoons. Inland from the river, *Leguminosæ* are well represented; I have probably nearly 100 species of this family. *Polygaleæ* are beginning to appear; eight or nine species of the genus *Polygala* occur about Rabba. The curious cucumber-like fruit of two species of *Kigelia* overhang the river banks; specimens of each are, I believe, already in the Kew Museum; but the glory of this family is a large-growing *Spathodea*, now covered with flowers as large as the hand, and of a colour only equalled by *Rhododendron javanicum*. *Rubiaceæ* are abundant; many handsome shrubs deserving of cultivation occur in this order. *Sapotaceæ* are numerous as trees, and the *Ficus* tribe are found everywhere.

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* A specimen enclosed in the Letter shows this to be an *Azolla*.—SECR.

Of the little-known Guinea-Peach, *Sarcocephalus esculentus*, I have both flowers and fruit preserved; the latter is fine-looking, but not very palatable. Of other edible fruits, some species of *Spondias* are not amiss; while about seven distinct fruits, known as "plums," are also eaten. At Idda we purchased fruit of a kind of Mango; the tree producing this could not be seen, but I have preserved several species.

Of all fibres, gums, dyes, cottons, or manufactured articles, I have procured specimens for the Museum at the Botanic Gardens, likewise of woods or fruits, whenever space will allow: none of these can be sent to England till we return. According to present arrangements, I shall probably be rather longer engaged than the term of my appointment indicated when leaving home, a voyage up the Chadda being spoken of when we return down the Kworra; but unless much improvement takes place in the health of our party, very few I believe will care for another year on an African river.

In this note I have merely given a rough outline of the vegetation, in an unconnected form; it is written hastily in consequence of our starting some hours earlier than I expected, therefore much is omitted.

On the Question whether Linnæus, in a spirit of ill-will, altered the spelling of the name of the genus *Buffonia*? By Mons. A. L. A. Fée, Professor of Botany of the Faculty of Medicine at Strasburg. Communicated by Thomas Moore, Esq., F.L.S.[*]

[Read February 4th, 1858.]

The genus *Buffonia*, of the family of *Caryophylleæ*, the type of which is *Buffonia tenuifolia*, remarkable for the facility with which the stamina vary in number, being sometimes reduced to two, and sometimes increased to eight, has been variously spelled, authors either admitting or not admitting the doubling of the *f*. We are about to show how this has occurred.

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[*] Translated from the French.

Although several botanists, even among contemporaries, have attributed this genus to Linnæus, it is certain that it belongs to Sauvages. What may have led to this mistake is, that the first official mention of the genus is found in the first volume of the 'Amœnitates Academicæ,' page 386, under the year 1749, in a thesis of Dassow, maintained under the presidency of Linnæus on the 12th of June 1747, and that the generic characters are there given, for the first time, four years before Sauvages himself published them. In this Thesis we read, "*Bufonia, auctore Sauvages*;" it should have been added, "*in litteris ad Linnæum.*"

The correspondence of these two illustrious men lasted for no less than eight-and-twenty years: it commenced on the 20th of January 1737, and terminated on the 3rd of May 1765, about eighteen months before the death of Sauvages. The letters, forty-three in number, are now in the possession of M. d'Hombre-Firmas, of Alais, grand-nephew of the celebrated Professor of Montpellier, who has long had the intention of publishing them. They are interesting, and I have been permitted to satisfy myself that they do not enable us to determine the precise date of the creation of the genus *Buffonia*. Nevertheless they contain the proof that it is anterior to 1745, inasmuch as in a letter of the 15th of October of that year, Linnæus says that the flower is tetrandrous, and that he will make sure of this on more perfect specimens, his own being incomplete; and long afterwards, in Letter XIX., of the 20th of August 1753, he begs Sauvages to settle his doubts on this point: "*quæso etiam hac æstate examines stamina Buffoniæ; Lœflingius scribit 4 esse in singulo flore.*"

It thus becomes perfectly certain that Sauvages, before definitively constituting the genus *Buffonia*, referred it in 1743 or 1744 to Linnæus, towards whom at that time converged all discoveries of interest in natural history. Linnæus and Dassow having written *Bufonia*, we may be allowed to believe that Sauvages wrote the name in the same manner in his correspondence.

The typical species of this genus, although (contrary to the statement of certain authors) a native of dry and sandy soil, bears an astonishing resemblance to *Juncus bufonius* of our marshes, and Linnæus may have supposed that the generic name was destined to recall this external analogy, being ignorant of the naturalist to whom the genus was dedicated. Had Sauvages written *Buffonia*, he would have remarked that Linnæus, in his letter of the 15th of October 1745, had mis-spelt the name, and Linnæus, thus warned, would have rectified it in his letter of the 20th of August 1747. Not only is this not done, but we shall see that the Montpellier botanist himself gives an official consecration to the error, in complete disagreement with the etymology.

The 'Methodus Foliorum, seu Plantæ Floræ Monspeliensis,' a remarkably curious work, published at the Hague in 1751, gives the generic characters of *Buffonia*, followed at p. 141 by these words, "dicata illustrissimo Horti Regii Parisiensis Præfecto, et Acad. Regiæ Scient. Paris. Sodali D. de Buffon;" and by a singularity not easily to be accounted for, Sauvages prints, or allows to be printed, *Bufonia* in his text, while in the index he places *Buffonia*, without indicating that it is the correction of a mistake. More than this, after the generic name he adds an *L.*, as if Linnæus were the founder of the genus. Thus we have a justification for those botanists who attribute the genus *Buffonia* to Linnæus; and thus we can explain how it has happened that Linnæus, in the "legal" edition of his 'Species Plantarum,' 1764, Lamarck in 1783, in the first volume of the 'Encyclopédie Méthodique,' Gærtner in 1787, in his work 'De Fructibus*,' Jussieu in his 'Genera Plantarum,' 1789, and a multitude of other authors, have written the name *Bufonia*, in submission to the text of Sauvages and to that of the 'Amœnitates.'

It evidently results victoriously from the preceding exposition that the alteration of the generic name *Buffonia*, by the suppression of one of the *f*'s, cannot be in any respect attributed to Linnæus, but to Sauvages himself, and thus are annihilated all assertions to the contrary, made in a multitude of books, which have found credulous readers, who perhaps were not displeased to discover in a great man, in spite of their esteem for him, what they regarded as a weakness. Nevertheless, to render the justification, if possible, still more complete, let us admit for an instant that Linnæus was desirous of making an unworthy approximation between an illustrious adversary and a filthy animal. Every action having an object, let us ask ourselves what could be Linnæus's object in so doing? "He wished," it may be said, "to avenge himself on Buffon, who had combated his ideas of reform." Who can think thus of a man, who up to that time was ignorant even of the name of his future adversary, occupied till then only with geometry, physics, and rural economy, works doubtless of some importance, as they obtained for him admission into the Academy of Sciences as early as 1733? The printing of Buffon's 'Histoire Naturelle' extended from 1749 to 1767, and it was during this interval that the reputation of Buffon was diffused and popularized. If this great man was known in Sweden prior to this epoch, it was not by Linnæus. Revenge can only be taken for an actual injury, and Linnæus had no reason to complain of attacks which had never taken place. We may here invoke a material impossibility—a sort of *alibi.* It is a petty calumny directed at one and the same time against two great names. We may consequently say with Richter (Opera Omnia Linneana, 1836), "Nomen iniqua mente a Linnæo in *Bufoniam* (pro *Buffonia*) mutatum esse, probent ii qui narrant."

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* Gærtner, it should be observed, spells the name with the double *ff*, quoting "*Bufonia*, L." as a synonym.—J. J. B.

Linnæus had his adversaries, and what man of genius has not? But in his writings we should seek in vain for traces of ill-temper. He had an elevated tone of thought, an excellent heart, and great dignity of character. He was, if I may be pardoned the expression, a very good great man. Controversy was his antipathy; he thought, not without reason, that his time was better employed in improving former publications and preparing new ones; and this was the wisest mode of reply. He not only disliked, but he feared, scientific polemics. The proofs of this assertion are as numerous as they are convincing. He answered neither Heister, nor Siegesbeck, nor Browallius, nor any other opponent. "My old friend Ludwig," he writes to Haller, "wishes to attack me, and I shall be easily conquered, for I lay down my arms beforehand. I will not defend myself." Having reason to complain of Haller, who had greatly ill-used him, he wrote thus in his 'Flora Zeylanica':—"In Germania inter Helvetos eminet alter Boerhaavius Hallerus. Cl. Hallerum esse mortalium omnium laboriosissimum, inque Theoria Medica et Anatomia hodie summum, norunt omnes. In Botanicis insuper plures investigavit et descripsit plantas quam ullus facile alius. Inique itaque dixere nonnulli me minus mite de viro optimo scripsisse; et sciant velim me ejus scripta et observationes ubique magni facere et attente volvere, cum in tota Germania vix adhuc alius meliora præstiterit."

All reformers are heated and intolerant. Linnæus was an exception; he was mild and benevolent. It has been written, and I have myself repeated it*, that he dedicated to antagonists plants of an ungraceful habit, thorny, or singular in some of their parts. This might possibly have been so, and there would have been no great harm in it; nevertheless *Siegesbeckia orientalis*, which recalls the name of one of his most furious antagonists, is a very beautiful *Composita*; and one of the largest trees in creation is dedicated to the memory of Adanson, a reformer who wished to reform *alone*. Linnæus knew neither envy nor hatred, and showed himself satisfied with the share of esteem and of renown which he had conquered. I have said elsewhere*, that on being made acquainted with the injurious intentions with reference to Buffon attributed to him by his enemies, he was indignant at the imputation.

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* See my 'Vie de Linné,' p. 120, *et seq.*

And what has happened to those who attacked Linnæus? Those who founded on these attacks a hope of fame, have been forgotten; while the opposition of those whose labours have deserved well of posterity is no longer remembered; what they did for science alone remains standing. Time, that great "justicer," puts everything in its proper place, and leaves on the head of genius the imperishable crown, from which the envious have laboured in vain to tear away some of the jewels.

Buffon certainly, glorious and honoured, could have no envy towards Linnæus; but how much preferable would it have been, could he have refrained from writing against that ingenious reformer! Not only was his logic at fault, but even his science. For example, while blaming the construction of the class *Mammalia*, now universally adopted, he ought not to have said that it had been known since the time of Aristotle† that the Horse has no mammæ, and he ought not to have concluded from this that the Horse is an exception among Mammalia‡.

Let us go no farther; if to blame is easy, let us not forget that it has its dangerous side, and let us abstain from touching one of the greatest of our national glories. Let us be satisfied with having contributed to efface the slight spot which had been thought to tarnish the brilliancy of a justly venerated name, that of a man who by his genius has deserved to obtain the right of citizenship in every country of the civilized world.

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* 'Vie de Linné,' p. 287.

† *Τὰ δὲ μωνύχων τὰ ἄρῤενα οὐκ ἔχουσι μαστοὺς πλὴν ὅσα ἐοίκασι τῇ μητρὶ, ὅπερ συμβαίνει ἐπὶ τὸν ἵππον.* "In the Class of *Solipeda* the males have no mammæ, except in some individuals which resemble their mother: this is met with among horses" (Aristotle, lib. ii. 8). Thus Aristotle only says that the presence of mammæ in the Class of *Solipeda* is not universal, which, although false, is less absolute than what Buffon says.

‡ Buffon, Histoire Naturelle, 1749, i. p. 38 (Sur la Manière d'écrire l'Histoire Naturelle).

Note on the preceding Communication.

By JOHN J. BENNETT, Esq., F.R.S., Sec. L.S.

[Read February 4th, 1858.]

SINCE the receipt of M. Fée's paper, I have carefully examined Sauvages's Letters to Linnæus, preserved among the Linnean Correspondence in the Society's Library, and have found in them several passages entirely confirmatory of M. Fée's conclusions, although they invalidate the force of some of his arguments.

The first of these passages is contained in a letter from Sauvages dated Sept. 14th, 1745, in which the learned Professor of Montpellier transcribes for Linnæus his characters of the genus "Buffonia, in honorem D. de Buffon, Ac. Reg. Par." In a subsequent letter, under the date of October 26th in the same year, he supplies an amended character of *Buffonia*, on which Linnæus has noted in the margin "optime." Sauvages adds:—"hanc mihi communicavit Medicinæ studiosus D. Marchant oculatissimus." He transmits a specimen, and adds, "Ignosce, quæso, colendissime amice, si coram te plantam novo nomine generico indigitare ausim: hoc me judicio subjicio; tuum est mea omnia emendare." The Dissertation in which Linnæus first published the genus "BUFONIA. *Autore Fr. de Sauvages*" bears date June 15th, 1747, and in a letter of the date of Sept. 15th, 1747, after hearing of this publication, Sauvages has the following passage, which is conclusive as to the *animus* both of Linnæus and himself in regard to Buffon:—"Pergratum et mihi et Ill° D. de Buffon, horti Reg. Paris. Præfecto, et Academiæ Parisinæ Socio meritissimo, videbitur, quod nomen illius generi novo plantæ cujusdam inditum fuerit et sic immortalitati consecratum: cum primum hic liber [Dissertatio nempe resp. Dassow, "Nova Plantarum Genera"] Lutetiam appulerit, scribam ad Ill. Buffon ut tua et mea erga ipsum officia extollam." The only other reference to the subject that I can find in the Letters is under date of Sept. 13th, 1753, where, in answer to Linnæus's statement of Lœfling's observation that he found four stamina in each flower, Sauvages says, "*Buffonia* rite examinata est diandra; utrum variet inter Hispanos nescio. Mitto semina ut ipse videas." Throughout the whole of Sauvages's letters the name is spelled correctly with the double *ff*; and it is only in the body of his work that Sauvages has (inadvertently, as his index shows) adopted the erroneous spelling.

The name thus mis-spelt was published by Linnæus in 1747, and it was not until 1749, as M. Fée justly remarks, that the offence which it has been supposed to be intended to avenge, was given to Linnæus and all other "methodists" in the preface to Buffon's great work, commenced in that year. That Sauvages at least felt this offence strongly will be seen by the following extracts from his letters; but that this feeling could not have influenced either him or Linnæus two years before the offence was given, is equally manifest. In a letter bearing date April 3rd, 1750, after referring to the attacks of Lametrie and others, Sauvages proceeds as follows:—"Alterius certe ordinis sunt censores quos in te nuper insurgere intelligo; scil. D. Daubenton, vel de Buffon, in *Historia Naturali Universali,* quam recens edidit, et quam nondum vidi, et D. Heister in altero opusculo in quo nomenclaturæ plantarum leges novas protulit. Primus, seu D. de Buffon, quod miror maxime, omnes methodos improbat, et contendit facilius citiusque addisci historiam animalium, plantarum, &c. in individuis quam in specificis genericisque descriptionibus. Anne umquam putasses quod tam absona absurda opinio in animalis rationalis mentem venire potuisset? Hoc tamen ad me scribunt, unde non doleo quod a te recedit qui a ratione tam alienus est." And in a letter of November 15th, 1751, he continues in the same strain, referring to the Epistle to Linnæus prefixed to his own 'Methodus Foliorum,' then just published. "Videbis," he says, "quomodo paucis confutem D. Buffonem, qui existimat, mirum dictu, sine ulla methodo addiscendam esse et docendam historiam naturalem, quod certe numquam in mentem cordati hominis venerat. Malo, certe, te ab homine ita transverse cogitante carptum esse quam laudatum. Decorum etenim est illis displicere quibus ipsa ratio displicet."

The charge of mis-spelling the generic name of *Buffonia* from pique or malice having fallen completely to the ground, it may be worth while also to correct an error in regard to the specific name, to which no less an authority than that of our distinguished founder, Sir James Edward Smith, has been given in the following passage of his 'English Flora':—"Sauvages named this genus after his great countryman Buffon, who had indeed very *slender* pretensions to a botanical honour; a circumstance supposed to have been indicated by Linnæus in the specific name *tenuifolia.*" A reference to the synonymy of the plant is all that is needed to show, that in this instance Linnæus simply adhered to his usual custom of adopting for his specific name, wherever practicable, a characteristic portion of the name by which it had been previously known. In this case he found a specific name admirably adapted to the plant in the "Alsine polygonoides *tenuifolia*," &c. of Plukenet, and adopted it without hesitation.

M. Fée states the number of Linnæus's letters to Sauvages, in the possession of the Baron d'Hombre-Firmas, to be 43, commencing January 20th, 1737, and ending May 3rd, 1765. Those of Sauvages to Linnæus, in the possession of the Linnean Society, are 63 in number, commencing Sept. 10th, 1737, and terminating April 7th, 1765. From a reference to it in Sauvages's second letter, it would appear that Linnæus's first to him bears date on the 20th of *June*, and not of *January*, 1737; a mistake which might easily arise between the contracted forms of "*Jan.*" and "*Jun.*" The whole series of Sauvages's letters contains much interesting information, relating not only to the state of botanical and medical science, but also to the personal history and character of the professors of both.

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